# THE SOIL SCIENCE SOCIETY OF FLORIDA

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# PROCEEDINGS VOLUME V-B 1943

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**Fifth Annual Meeting of the Society**

**University of Florida, Gainesville**

**December 10 and 11, 1943**

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OFFICERS OF THE SOCIETY*

1944

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| Gaylord M. Volk | President |
| W. E. Stokes | Vice President |
| H. I. Mossbarger | Past President |
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*Retiring Officers listed on page 74

## ACKNOWLEDGMENTS

It is indeed a pleasure to acknowledge the deep personal interest of President Tigert and of many other officials of the University in general and of the College of Agriculture in particular, in the work of the Society; and to thank him and them for making the splendid facilities of this organization available to us here on the campus for our meetings this year.

Especially would we like to thank Provost Hume for making space available in the College of Agriculture for the meetings and Dr. C. V. Noble, Head, Department of Agricultural Economics for the constructive part he personally took in the proceedings of these meetings in discussing critical angles of the various subjects in hand for the definite bearing his own field of interest and Department found in them.

We also have very much need to thank Dr. F. B. Smith, Microbiologist, Department of Soils, for the kindly and constructive greetings in behalf of the Administration of the University which he extended so effectively at the opening meeting and which served as a most excellent background for the lengthy discussions that followed.

Finally, it is with much real sorrow that we here acknowledge the prolonged illness of Provost Wilmon Newell and his recent call to eternity. We are confident that the broad and constructive interest he always showed in important and even pressing agricultural problems such as were discussed in these meetings and the energetic part he always enjoyed taking in them must have surrounded our efforts in a spiritual sort of way and added substantially to the success of these efforts. His personal interest in the work of the Society is well indicated by a quotation taken from an earlier letter to the Secretary of the organization which was printed on the back of the front cover of Proceedings Volume II (1940) and now reprinted in the same position on the cover of this volume.

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DR. WILMON NEWELL

March 4, 1878 — October 25, 1943

## A STORY OF A FLORIDA FARM

Rather than repeat the well-known facts of Dr. Newell's life and accomplishments by way of dedicating this volume of the Proceedings, which has been given over so largely to the discussion of soil survey and land use problems, to his memory, it is felt it might be even more appropriate to describe a very interesting experience he had in pear culture out on his little farm near Gainesville that probably did more than anything that had happened to him in his whole life in revealing the truly vital character of the soil survey in its all but indispensible role in sound land use planning—at least on anything like a public service scale. This type of experience has been encountered by thousands of individuals the State over and on this account we call it The Story of a Florida Farm rather than Dr. Newell's farm.

In any event Director Newell wanted to raise pears on a goodly portion of his little farm. However, on one side of the paved road which ran directly through his property they grew very well indeed while on the other side of the road they failed completely even after a succession of replantings.

In an effort to get at the trouble Dr. Newell brought in samples of topsoil to the laboratory from time to time but they never revealed anything that seemed particularly helpful in relation to the situation. One morning while discussing the matter with him and he was wondering about the advisability of bringing in further soil samples I asked him if it might not be a good idea if we were to go out and took a good look at the orchards and at the soils, perhaps in depth. To this the Director demurred in that highly conscientious manner that all will recognize who knew him with the remark that was delightfully akin to a proposition and a challenge perhaps not altogether free of hope when he said "but the only time we could go would be Saturday afternoon." Quite ready agreement was reached that the pear trees probably would not know much difference between Saturday afternoon and Tuesday morning. So, the following Saturday afternoon, January 6, 1940, we were accompanied to the grove by G. M. Volk and J. R. Henderson, the latter with his trusty soil auger.

The first boring in the good section of the grove readily revealed the Blanton fine sand with its deep open subsoil to which the native vegetation was responding as in Fig. 2 (upper), and Dr. Newell's pear trees as in Fig. 2 (lower). Obviously the pears were very happy about the soil and the Director was very happy about the pears in this section of the grove. His comment at the time was "if all the trees were like these I could really make some money growing pears." This soil is shown as No. 114 on the soil map of the farm in Fig. 1.

Crossing the highway to the area where the pear trees were doing so poorly, the very first boring told essentially the whole story for it revealed a dense, intractable subsoil so near the surface as to permit little root penetration and causing the soil to be quick to flood at times of rainfall and to dry out during dry periods. This was found to be quite a typical Leon fine sand as shown under number 10 on the map

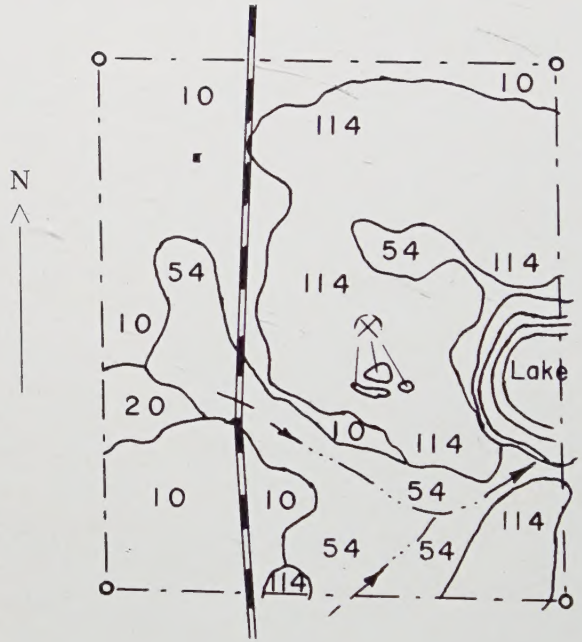



Figure 1.—Soil map of a small farm in the flatwoods section of Alachua County, Florida, between Gainesville and LaCrosse.

Legend: 114—Blanton fine sand
10—Leon fine sand
20—St. John's fine sand
54—Portsmouth fine sand
x—Borrow pits (Crossed picks)
Scale 8 inches equals 1 mile.

of Fig. 1. The general appearance of the native vegetation on this soil is shown in Fig. 3 (upper), and the failing condition of the pear trees in Fig. 3 (lower).

The soils of this farm have been described by Mr. Henderson as consisting of Blanton fine sand, Leon fine sand, St. Johns fine sand and Portsmouth fine sand. According to him these differ from each other in several respects due to the variations in the depth of the water table. The Blanton soil is well-drained and the water table is usually at depths below three feet. The Leon soil is imperfectly drained and the water table is usually at depths of 18 to 24 inches. The St. Johns soil is poorly drained and the water table is about 12 to 18 inches below the surface. The water table of the Portsmouth fine sand is usually at the surface or only a few inches below the surface. As a result of variation in depth of water table, profile characteristics of the various soils are quite different. Their distribution on this little farm, as has already been pointed out, is well shown on the map of Fig. 1. This is as taken from the standard Soil Survey Map of Alachua County with no added detail.

The Blanton fine sand consists of gray to brownish-gray fine sand about four inches thick resting on pale yellow or pale yellow and gray splotched fine sand, which at depths of 30 to 36 inches passes into gray and yellow mottled fine sandy loam or fine sandy clay loam. The Leon fine sand has a gray surface, three to four inches thick, which rests upon light gray to white fine sand. A black or dark brown, organic hardpan is encountered at depths of 18 to 24 inches. This hardpan layer consists of fine sand cemented with organic matter and is usually about six inches thick. Light gray or yellow fine sand is found beneath the hardpan and this continues to depths of three feet or more.

The St. Johns fine sand resembles the Leon soil in many respects but it differs from the Leon soil in having a thicker and darker surface and having the organic hardpan at shallower depths, usually between 12 and 18 inches below the surface. The Portsmouth fine sand consists of eight to ten inches of light gray to black fine sand underlain by a light gray to pale yellow fine sand.

All of these soils are strongly acid in reaction under natural conditions and are poorly supplied with plant nutrients. The Blanton soil is widely used for the production of field crops and is used to some extent for the production of tung and pecans. The Leon soil is not generally used for crop production. The organic hardpan layer interferes with movement of the water. In dry periods crops may suffer from lack of moisture and in wet periods they may be drowned out. The St. Johns soil is similar to the Leon soil as regards management problems. With proper management the Portmouth soil may be used for the production of a wide variety of vegetable crops.

On this particular farm, portions of the Leon and Blanton soils were planted to tung and pears. These crops did very well on the Blanton soils, but very poorly on the Leon soils. As these crops were fertilized and managed similarly on both soils, the poor response on the Leon soil can be attributed to the effect of the organic hardpan on moisture conditions and root penetration. As tree roots do not readily penetrate the organic hardpan, trees on the Leon soil are naturally shallow rooted. Moreover, during periods of heavy rainfall the water table of the Leon soil rises and many roots are destroyed.

Figure 2.—Blanton fine sand with open, well-drained subsoil (No. 114 on map of Figure 1).
*Above:* Natural vegetation. *Below:* Normal growth of pear trees.

When Director Newell realized, for the first time, that soil type changes could be so sharp and so dramatically significant in terms of crop adaptability over such a short distance his reaction, as in other decisions that so characterized his full life of large-scale accomplishments, was one of complete and immediate acceptance; just as in the case of the Mediterranean fruit fly in 1929 it was—ERADICATE.

Inasmuch as we now have a new soil survey law and a new soil survey program in process of development as a basis for post war planning and all the important implications that go with it, this personal experience and reaction of Director Newell in this field is given in the hope that its very simplicity will assist others in gaining the most positive views possible on the importance of the soil survey to land use planning in particular and to agricultural planning in general.

With the thought of giving our members a full view of this little farm that is characteristic of many thousands of little farms in Florida that await the assistance of the Experiment Station and the Extension Service in the solution of their every day planning problems, Mr. Henderson's full profile description of each of the four types of soil appearing on the map of Fig. 1 is given below along with a description of the general series under which each falls.

## BLANTON SERIES

The Blanton series includes the well drained soils with light gray surface soils and light yellowish-gray upper subsoils which have developed from thick deposits of unconsolidated sands and clays. They occur in close association with the Norfolk and Leon soils. These soils are strongly to very strongly acid. They differ from the Norfolk in having more of the gray color and less of the yellow in the subsoil, in having weaker relief, and, in places, in having imperfect drainage. They were originally covered with longleaf pine and wire grass. Where cultivated, they are used mainly for the production of field crops but small areas are used for vegetables, citrus, pecans, and tung.

*Blanton Fine Sand.*—Blanton fine sand is well distributed over the eastern half of the county, occurring in small to large areas. It is closely associated in occurrence with Norfolk fine sand, and Rex loamy fine sand. It is more gray in both the surface soil and subsoil, lies at comparatively slightly lower levels, and has generally a smoother surface than the Norfolk fine sand. It is not as excessively drained as the Norfolk fine sand but it is better drained and is generally more undulating than the Rex loamy fine sand.

A representative profile in a forested area is as follows:

0-3″ Light grayish-brown loose fine sand containing a small amount of organic matter.

3-20″ Grayish-yellow or light gray loose fine sand.

20-30″ Grayish-yellow or light gray fine sand containing splotches of whitish fine sand.

30-50″ Yellowish-gray or grayish-yellow fine sand with splotches of light gray or whitish fine sand. In some places this layer contains considerable clay.

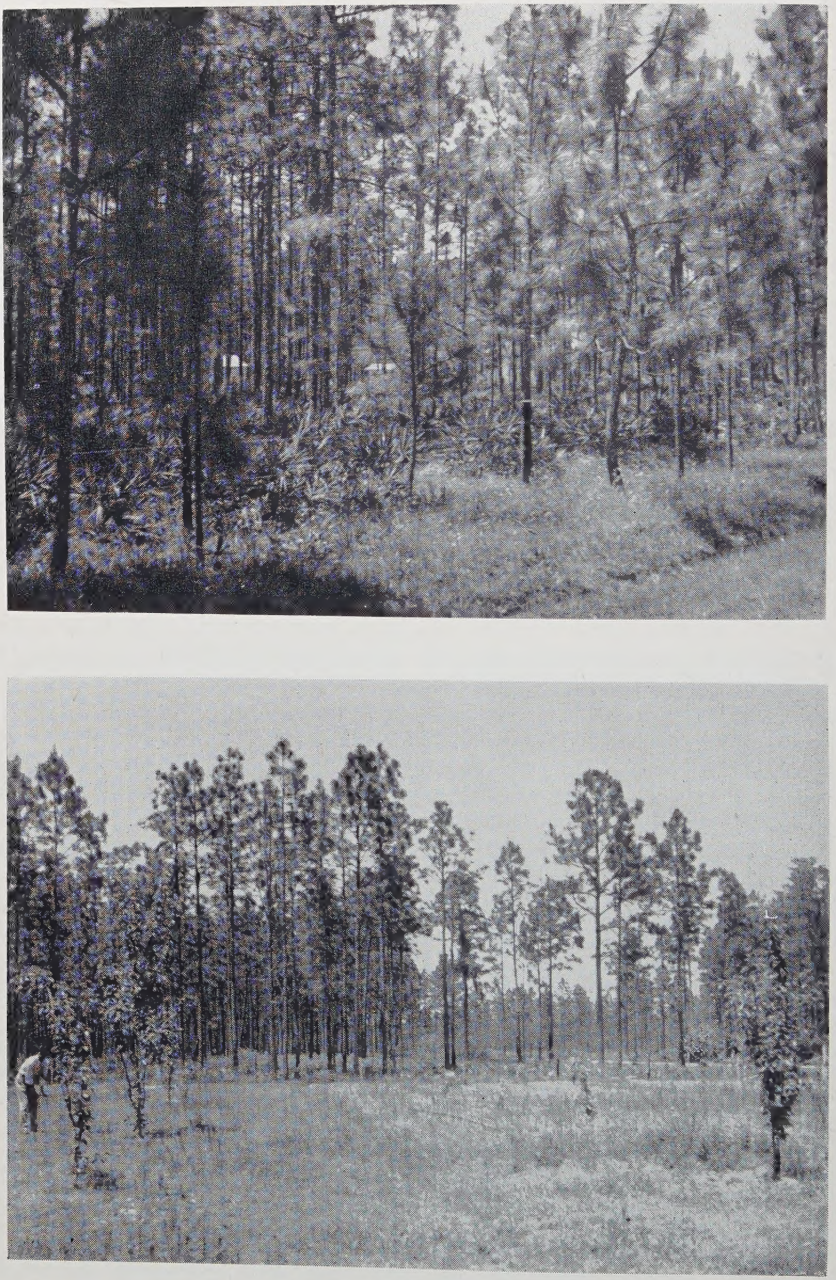


Figure 3.—Leon fine sand with hard pan in subsoil which acts as impediment to drainage and to root development and promotes droughtiness. (No. 10 on map of Fig. 1.)
*Above:* Natural vegetation. *Below:* Pear trees failing badly.

Both surface and internal drainage are good. The splotched coloration in the subsoil indicates that the internal drainage is not as good on this soil as on the Norfolk fine sand but perhaps the moisture holding capacity is better. Blanton fine sand has almost level, undulating or gently sloping relief.

About 15 to 20 percent of this soil is cultivated, perhaps 5 to 10 percent is abandoned or idle land and the remainder supports a growth of longleaf pine and wire grass with a scattering of live oak and turkey oak. Of the cultivated soil about 40 percent is devoted to intertilled crops of corn, peanuts, and velvet beans. A small percent is used for the production of tobacco, watermelons and other crops. Some pecans and tung are grown on this soil.

Corn yields from 8 to 10 bushels per acre; peanuts 400 to 500 pounds; cotton 150 pounds; and tobacco from 700 to 900 pounds. The yields of sugar cane, cucumbers, sweet potatoes, and okra are comparatively low. The amount of fertilizer applied and the general farm practices are similar to those for the Norfolk fine sand.

Blanton fine sand is low in mineral plant nutrients and it is also very low in humus. This soil would be greatly improved by the incorporation of green manure crops. Crotalaria grows well on this soil and when turned under should improve it and increase crop yields.

## LEON SERIES

Leon soils are developed from unconsolidated sands and clays upon flat, poorly-drained surfaces in the sandier portions of flatwoods. They are closely associated with the Scranton, Portsmouth, St. Johns, Rex, Bladen, and Plummer soils. Like the darker colored St. Johns soils they are characterized by an organic hardpan layer. The surface soils are gray; the upper subsoils are light gray or grayish-white; and the lower subsoils, which occur most commonly at depths of 18 to 24 inches, consist of black or brown organic hardpan. They are very strongly to extremely acid. The natural growth consists of longleaf slash pine, saw palmetto and wire grass. These soils are used mainly for forestry and grazing but a few acres are devoted to truck crops.

*Leon Fine Sand.*—Leon fine sand covers a large total acreage in Alachua County. It occurs in large continuous areas in the eastern half of the county particularly between Gainesville, Lacrosse, and Waldo and in the southeastern corner of the county. It is closely associated in occurrence with the St. Johns, Plummer, Blanton, Portsmouth, Scranton and Rex soils and to a less extent with the Bladen loamy fine sand. Its surface is prevailingly flat and natural drainage is poor to imperfect.

A representative profile of a virgin area is as follows:

0-4″ Medium gray fine sand with a noticeable amount of loose organic matter; this organic imparts a dark color or a color resembling a mixture of salt and pepper.

4-20″ Light gray to almost white loose fine sand.

20-28″ Hardpan layer consisting of fine sand cemented or held firmly by organic matter. The first 2 inches is black and hard

and below this is a dark yellowish-brown and slightly compact fine sand.

28-60″ Light yellowish-brown loose fine sand.

Practically none of the Leon fine sand is under cultivation and without water control it is generally considered practically worthless for cultivated crops. Its principal use is for forestry and range pasture. The tree growth is mainly longleaf and slash pine which afford saw timber, cross ties and poles. Saw palmetto and wire grass form the common undergrowth. There is also some gallberry, huckleberry, runner oak, wire grass and other grasses and, in the low places, some myrtle. Timber production as a permanent industry should be possible on this soil. Not only lumber but also turpentine and other naval stores can be produced. With particular attention given to reproduction, care of young trees, fire prevention, careful boxing for turpentine and cutting of mature timber only, a profitable and permanent industry could be developed.

The most common native pasture on the Leon fine sand is wire grass. Less important grazing plants are wild oats, broadleaf grasses and sedges. According to experiments carried on by the Florida Agricultural Experiment Station it has been learned that the carrying capacity of ranges on cutover areas of this soil can be increased by burning off the wire grass during the summer to retard its growth and by seeding improved grasses.

If this soil is to be used for cultivated crops it is recommended that the organic matter content be increased, lime applied and irrigation practiced.

## ST. JOHNS SERIES

The soils of the St. Johns series are characterized by very dark gray surface soils and organic hardpan subsoils. They are associated with the Leon soils from which they differ in having a thicker and darker surface layer. These soils are derived from unconsolidated sands and clays, and occupy very poorly drained flats. Like the Leon soils, they are very strongly to extremely acid. The natural tree growth is largely slash and pond pine. Its use is for forests and pasture.

*St. Johns Fine Sand.*—St. Johns fine sand occurs in association with the Leon and Portsmouth soils and peaty muck in the eastern half of the county. It differs from Leon fine sand in having more organic matter in the surface soil, in being situated at a lower elevation, and in being more poorly drained.

A representative virgin profile is about as follows:

0-8″ Dark gray, acid fine sand.

8-18″ Dingy gray fine sand.

20-26″ Dark brown or black acid, fine sand cemented with organic matter.

26-40″ Light gray, acid fine sand.

St. Johns fine sand is not cultivated. It is covered with slash pine and pond pine, with an undergrowth of saw palmetto, fetterbush, gallberry and wire grass. The slash pines are boxed for turpentine and provide saw logs, cross ties, poles, and pulpwood; whereas, the wire grass is grazed by cattle and hogs. It is possible to increase the carrying

capacity of the range pasture by putting into practice the suggestions offered for the improvement of Leon fine sand.

## PORTSMOUTH SERIES

The Portsmouth soils have developed from unconsolidated sands and clays on low, level, poorly drained surfaces. The surface soils are dark gray or very dark gray with considerable organic matter to depths of 8 or 12 inches, and the subsoils are gray with brownish-yellow and yellow mottlings. They are very strongly to extremely acid. These soils are associated with the Leon and Bayboro soils. They differ from Leon in their thicker organic layer and absence of organic hardpan; from Bayboro in their more friable subsoil. In forested areas the natural tree growth consists of gums, bays, cypress, maple, and slash pine. Grazing and forestry are the principle uses of these soils.

*Portsmouth Fine Sands.*—Portsmouth fine sand is well distributed in small to fair-sized areas over the eastern half of Alachua County. It occurs in basin-like situations or in depressions in areas of Leon, Norfolk and Blanton soils.

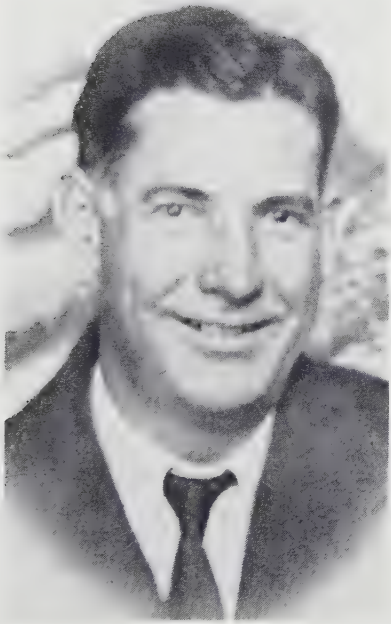
The surface soil of Portsmouth fine sand is a dark brownish-gray to black, loamy or mucky fine sand. This, at about 8 or 10 inches, rests on a yellowish-gray somewhat loamy fine sand, which continues downward to a depth of 48 or more inches.

A few very small areas of this land have been drained and cultivated. The remainder supports a tree growth of cypress, bays, and gum with here and there a few slash pine. Where artificially drained and properly fertilized, this land is well suited for the production of vegetables.

## SENATOR ERNEST R. GRAHAM

Chairman, Soil Survey Committee

Senator Graham's acceptance of the Chairmanship of the Soil Survey Committee shortly after the founding of the Society in 1939 was the most importantly favorable thing that had happened to this highly essential phase of our soils program up to that time. Following the Senator's correspondence with President Tigert in laying the groundwork and developing the essential form of the Soil Survey Bill and with the skillful and persistent assistance of Mr. Dewey B. Hooten, Executive Secretary of the State Planning Board, following its presentation to the two Houses of the Legislature there could scarcely be failure. This was well indicated by the fact that it passed the Senate unanimously (33-0) and the Lower House with only seven dissenting votes (64-7). It is the opinion of many that of all the great and good works Senator Graham did for the common good during his long period of tireless public service, the Soil Survey Law will come to be regarded as one of his most outstanding contributions to the public welfare.



## DEWEY BYRON HOOTEN

Executive Secretary, State Planning Board

As Executive Secretary of the Florida State Planning Board Mr. Hooten has ample reason for being intensely interested in the needs for and purposes of a State-wide soil survey as provided by the recent State law which was approved by Governor Holland on May 26, 1941 and filed in the office of the Secretary of State on the following day. As a matter of solid fact it is doubtful if the covering Bill would ever have found its way thru the intricacies of both houses of the Legislature except for the exceedingly hard and faithful work Dewey did in assisting Senator Graham, Chairman of our Soil Survey Committee and its sponsor in the Upper House, every moment during its travels thru both chambers of the Legislature. He was doctor, midwife and wetnurse for it at all times. If there is one person in all Florida who should be regarded as the father of our new Soil Survey Law it is Dewey B. Hooten.

The text of the Soil Survey Law was published in full on pages 136 and 137 of Proceedings Volume III, 1941.

# TRI-STATE DISCUSSION (GEORGIA, ALABAMA AND FLORIDA) OF THE PRESENT ORGANIZATION AND NEEDS FOR IMPROVEMENT OF THE FEDERAL-STATE SOIL SURVEY

December 10, 1943

Vice President G. M. Volk, Chairman

The meeting was called to order at 10:00 A.M. by Chairman Volk and regret expressed that the President of the Society, Mr. H. I. Mossbarger, could not be present. The following telegram from Mr. Mossbarger was read by the Secretary:

Miami, Florida
December 9, 1943

Mr. G. M. Volk, Vice President
Soil Science Society of Florida
Gainesville, Florida

Greatly regret unable be in Gainesville on tenth or eleventh for the important discussions listed on program of society and extend every good wish for success of meetings. Am personally very much interested in the development of a thoroughly sound soil survey program for the State of Florida as a basis for planning an intelligent agricultural program for the postwar period and for all time to come and pledge my every assistance to that end.

H. I. Mossbarger

A letter of regret at being unable to be present also was read from Dr. S. S. Obenshain, Head of the Soil Survey in Virginia and Chairman of the Soil Survey Sub-Committee of the Southeast Agronomy Research Committee.

The following guests from the neighboring states of Georgia and Alabama were then introduced: Dr. W. O. Collins, Professor Agronomy, University of Georgia, Athens; Mr. L. G. Brackeen, Head of Soil Survey, Auburn, Alabama; and Mr. F. E. Boyd, Virginia-Carolina Chemical Company, Montgomery, Ala.

The Chairman then called on Dr. F. B. Smith, Microbiologist in the Soils Department, for a few words of welcome in behalf of the University and the College of Agriculture and he responded as follows:

Dr. Smith:

Mr. Chairman and members of the Soil Science Society of Florida and friends: I want it understood that I am substituting, not pinch-hitting. President Tigert was to have been over this morning to give you a word of welcome but he was ill and unable to come. For him and on behalf of the University and College of Agriculture

and the Soils Department, the Soil Science Society of Florida welcomes you here today and tomorrow. We hope you will participate in the meetings, and that you will make as free use of our campus here as you wish and can. If there is anything we can do to make your stay more pleasant we will be very glad to do that.

With regard to attendance upon these meetings of the Society I would like to say that we appreciate the difficulties of travel that some of you undoubtedly have had to undergo to get here. Consequently we appreciate all the more the effort that you have made to get here. We appreciate also the great purpose of OPA and WPB and all those other agencies which are curtailing transportation and travel at this time, but we think that the objectives of this Society, and particularly of this meeting, are important enough to warrant the efforts that we have had to make to overcome the difficulties of holding this meeting. A great economist has said that the nature of the soils in a region not only determines the kind of crops that are grown and the number of farmers and their prosperity, but also affects every activity in the community and bears on the welfare of everyone and shapes the whole organization of society. Anything so important as that is certainly important enough for us to give a little attention. This should be particularly true right now while the whole country is getting ready for post-war planning. I think that on this account this meeting and the subjects that we are considering are most timely. So I am glad to see you fellows here, and I hope that you all have a nice time. I also hope that we can do something that definitely will forward the interest in soils and in soil and plant relationships in our States and in the Nation. Thank you.

The Chairman then called Dr. R. V. Allison, Head, Soils Department, University of Florida for a statement as to purpose and procedure in the discussion of the Soil Survey to occupy the entire day and he responded as follows:

DR. ALLISON:

Mr. Chairman, members of the Soil Science Society of Florida and guests: I would like first of all to call attention throughout the day to the record that we are undertaking to set down of the discussions that are to follow. Mrs. Marshall has very kindly consented to take it in shorthand and I am sure that we all appreciate the importance of cooperating with her as far as possible if we are to get a complete and comprehensive transcript of the meetings. Mrs Marshall is in the center of the room here and if, as far as possible, you will speak clearly, especially if you are somewhat removed, and speak as if you were talking to her, I am sure that she will give us a very good and complete statement of what is said.

I will touch only briefly on the background of the meetings we have planned for today. I don't believe we will need to go any further back than to the setting up of a regional soil survey sub-committee of the Southeast Agronomy Research Committee, of which Dr. Obenshain is chairman. It is for that reason in particular that Dr. Obenshain was anxious to be here. I only wish that he could have come because ever since his sub-committee was set up he has done everything possible to promote the very purposes and principles which our meeting here today was called to discuss.

About six months ago I started correspondence with Dr. Obenshain with the view of having a regional, 11-state, discussion at this time. As you know, however, the conditions of travel are such that we finally shrunk to a 3-state conference, feeling that if workers in the three states here represented, Alabama, Georgia and Florida, could get together and decide on certain principles and procedures it might serve as a nucleus for extending the thinking and planning to the other states by correspondence or otherwise.

The need for some such coordination in thinking and planning for the soil survey was well indicated by as many as three of what we call "rump sessions" in the Cincinnati meetings early in November. We had three distinctly different meetings at that time, mostly attended by state workers, in which there was an almost indescribable expression of need that something be done to bring our soil survey activities together, so that as the work covers a section or state and eventually the whole country, we will begin to feel that we have a well-integrated soil survey and a soil map of a county or state or region that means something rather than random approaches which do not always come out with sufficiently harmonious results to be broadly practical.

I was further impressed with the need for just such a discussion as we have planned for today after attending those discussions during the National meetings because, as Professor Collins said afterwards, and I feel the same way, we didn't accomplish very much in those short sessions. They were largely quite general discussions. To be sure, some of our problems were pointed out. The thing that was most apparent was that we didn't arrive at any conclusion. at being able to say, "What is the matter?" and "If it isn't all right, what is needed?" If we are not satisfied with various aspects of the soil survey now, what is really needed to give us what we want? Now if we have conferences like this and decide very definitely what we want we may get somewhere. Thus, Dr. Kellog raised a certain question in one of those Cincinnati sessions. He made a very definite point, and he may be right in some cases. He said, "I have asked state workers at different times how we should modify the soil survey and how we should change it, and I get no specific answers." Thus the only constructive and helpful thing to do is what we are doing today. I think we owe it to ourselves and to the Federal Bureau to give them all the help we can after the whole matter has been thought thru in a careful and systematic way.

So, contemporaneously with the progress of the meeting today, I hope we will all give thought to what we want to do with the results of it. That is the next step. We can get together within our own state, or with two or three other states, but if we just have a discussion like we did in Cincinnati and nothing definite or permanent comes out of it, it may not do very much good. The question I would like to bring up so we will all be thinking about it during the day is: "Shall we make two or three resolutions and let it go at that, or shall we bring all the material together and have it published as a proceedings?" If we are willing to put the time on it and have the record published so we will have a logical beginning point should there be another discussion, I think that is a basis for good, and we will be willing and glad to take care of it in the name of the Society if, at the end of the meeting, you feel that something definite will be accomplished by it. I feel that before the men from the other states leave we should discuss that question pretty carefully. I mention this particularly as a justification for taking a careful record. In that connection where any phase of a discussion is taken up for which the speaker has a written manuscript or statement to cover, please let it be known to the extent that your manuscript or statement will be available so that it won't be necessary to duplicate it on the record. If you want to say something you don't want on the record, just let it be known. Thank you.

The Chairman recognized the outlook for a rather lengthy and important discussion and called on Dr. C. V. Noble, Head, Department of Agricultural Economics in the Florida College of Agriculture to lead the way by making a few remarks on the place of the Soil Survey in agricultural planning from the standpoint of agricultural economics. Dr. Noble responded as follows:

DR. NOBLE:

Mr. Chairman, I am very much interested in Dr. Allison's remarks about soil surveys. I want particularly to say, as an outsider who is not acquainted with the intricacies of making these surveys, that I am deeply interested in detailed soil surveys for our own work. In fact, the only fault that I can find with them is the lack of them. In this State I believe we have about four or five percent of the land area surveyed in detail and published in a form available to other workers.

I am particularly interested in land economics and the most important basis for any work in land economics is the detailed soil survey. If we want to find what is the best use to be made of land, that is the starting point. Of course there are many other factors that enter in, such as climate, topography, the distance from markets, transportation facilities, the character of the people in the area—they are also very important. While many factors are important, a primary knowledge of what your soils are always should come first. In other words, if I were to pick out the most important need in post-war planning for agriculture in the State of Florida, I would say detailed soil surveys.

Strangely enough these surveys are needed as badly, if not more so, in the non-agricultural counties. This is the reason for such a statement. You usually start with the best agricultural counties to make soil surveys whereas in those counties

a great many of the more important mistakes already have been made and corrected by experience. However, when you get into the non-agricultural counties and undertake to expand the agriculture and you want to know what use is to be made of the land the mistakes are just beginning. The question is, then, why go thru all of that pain of putting crops on land that should never go into crops, or otherwise putting the land to the wrong use when a good, detailed soil survey would probably advise the correct use. So I am very much interested in this meeting and wish you all success in it. Thank you.

Before entering upon the general discussion the Chairman called attention to four particular phases of the work which could well serve as titles for special discussion or even brief, well-organized papers if the indicated leader in each instance should see fit to prepare same:

1. For whom is the soil survey report written and how should it be prepared? (W. O. Collins).
2. What soil characteristics are important from the standpoint of land use and how should they be mapped? (J. R. Henderson).
3. The development of soil groups or associations as a basis for interpreting the detailed soil map in preparing the soil survey report. (L. G. Brackeen).
4. Textural characteristics as a basis for naming soil types or phases in the Coastal Plains area of the Southeast. (M. Drosdoff).

In preparation for the discussion to follow the Chairman then presented an outline of about 50 questions which had been prepared earlier under the four principal headings into which the whole subject had been divided, and which are listed as follows:

I. Field Procedure

1. What are the characteristics that should be used as criteria for differentiating soils?
2. Which of the above characteristics are considered to be "Internal"? Which "External"?
3. Which are important in determining land use and soil management practices?
4. How much emphasis should be placed on character of parent material? How much on the character of the underlying geological formation?
5. How should horizons be designated in soil descriptions?
6. Should soil type names within a series be determined by the texture of the surface soil, or by the depth of the clayey subsoil, or by a combination of these?
7. If soil type names are to be determined by the depth of the clayey subsoil, how many types should be recognized and what should be the limits of depth for each type?
8. In sandy soils, what is the depth at which the presence of clayey materials, limestone, marl, or phosphatic materials become insignificant?
9. Should mechanical analyses of all important soils in the county be made during the course of the survey?

10. Is structure of any significance in the soils of Alabama, Georgia and Florida?
11. If so, what forms of structure are recognized in your state and which soils exhibit the various types of structure?
12. Is the term consistence, as commonly defined adequate for describing conditions often encountered in terms of porosity and structure?
13. Are the color standards now in use satisfactory?
14. Is color considered to be an important soil characteristic? If so, in what respect?
15. How much range in the content and depth of organic matter in the surface horizon should be allowed within a given soil?
16. How many kinds of drainage conditions should we use in soil mapping?
17. What is your concept of:
    (1) An excessively drained soil.
    (2) A well drained soil.
    (3) An imperfectly drained soil.
    (4) A poorly drained soil.
    (5) A very poorly drained soil.
18. In poorly or very poorly drained sandy soils, is there always a definite correlation between drainage and color or between drainage and organic matter content?
19. Can soil reaction on the acid side be used as a criterion for differentiating soils in the field?
20. Should slope be shown on all soil maps?
21. Should slope classes be the same for all soils?
22. Is slope of any significance on deep sandy soils where erosion is not a serious problem?
23. Should present erosion conditions be shown on the field maps? On the published maps?
24. If shown on the published map, should the prominence given be the same as that given soil type and slope?
25. Should land use or land cover be mapped?
26. Should land cover be shown on the published map?
27. If so, how should it be shown?
28. What conditions of land cover are considered important?
29. What scale should be used in the field mapping? On the published map?

## II. Inspection and Correlation

1. Is your state divided between two or more inspectors?
2. Is the present division of responsibility based on physiographic divisions or is it determined arbitrarily?
3. Do you think there is a tendency to establish too many soil series?
4. Have some of the new series "eaten up" some of the old, well established series?

5. Would it be better if all surveys in a given state were supervised by one man who spends all his time in that state?
6. If such an arrangement appears desirable, could not the regional inspector work with the state inspector alone rather than with the survey parties?

III. Land Classification or Soil Grouping

1. Are "productive ratings" as developed at present satisfactory for grouping soils?
2. Are the "land-use capability" classes developed on a satisfactory basis?
3. Should a standard type of land classification be developed or should the problems and characteristics of the area in question determine the type to be used?
4. What factors should we use as a basis for general land classification; for specific kinds of land classification?
5. Should a land classification map be superimposed on the detailed soil map?

IV. The Soil Survey Report

1. Is more than one type of soil survey report necessary?
2. What kinds of reports do you suggest?
3. Should each type of report be standardized?
4. If so, how much flexibility within the general form should be allowed?
5. What general topics should each type of report cover?
6. What can be done to increase the use of soil survey reports?

The following men took part in the discussion of the general subject during the day listed more or less in the order of their appearance as the discussion developed. The last three listed took part only in the second day of discussion. The list as presented therefore includes the names of all participants in the present discussion of the Soil Survey as well as that on Soil and Crop problems of mutual interest to the three States, held on Saturday morning, December 11th and reported in this volume beginning on page 50.

1. G. M. Volk, Soil Chemist, Agr. Expt. Sta., Gainesville
2. C. V. Noble, Head, Dept. Agr. Economics, College of Agr., Gainesville
3. L. G. Brackeen, Head, Soil Survey, Alabama Expt. Station, Auburn
4. J. R. Henderson, Soil Technologist, Agr. Expt. Sta., Gainesville
5. W. O. Collins, Head. Agron. Dept. College of Agr., Athens, Ga.
6. Phil Westgate, Asst. Horticulturist, Subtropical Expt. Sta., Homestead
7. Geo. D. Thornton, Asst. Soil Microbiologist, Col. of Agr., Gainesville
8. R. V. Allison, Head, Soils Dept., College of Agr., Gainesville
9. M. Drosdoff, Soil Chemist, Tung Investigations, U.S.D.A., Gainesville
10. Joe Winsor, Soil Technologist, Soil Cons. Serv., U.S.D.A., Gainesville
11. F. B. Smith, Soil Microbiologist, College of Agr., Gainesville
12. E. H. Long, Realtor, St. Petersburg
13. John H. Davis, State Geological Survey, Tallahassee

14. K. S. McMullen, Agr. Ext. Service, Gainesville
15. Colin Gunn, State Coordinator, Soil Cons. Service, Gainesville
16. W. E. Stokes, Head, Dept. of Agronomy, Agr. Expt. Sta., Gainesville
17. F. S. Jamison, Hort. Dept., Univ. of Fla., Gainesville
18. E. B. O'Kelley, Atlantic Coast Line R.R. Co., Jacksonville
19. H. B. Helms, Soil Conservation Service, Gainesville
20. F. E. Boyd, V-C Chemical Co., Montgomery, Alabama
21. W. L. Lott, Soil Chemist, U. S. Sugar Corp., Clewiston
22. J. R. Neller, Vice-Dir. in Charge, Everglades Expt. Sta., Belle Glade
23. R. E. Blaser, Asst. Agronomist, Agr. Expt. Sta., Gainesville
24. L. E. Ensminger, Asst. Soil Chemist, Agr. Expt. Sta., Gainesville
25. J. J. Taylor, State Chemist, Dept. of Agr., Tallahassee

It was agreed that the soil survey discussion should center around State-wide interests in each case rather than on mutual interests of a local nature across State boundaries such as will be covered in the discussions of land-use problems tomorrow. In other words the review and discussion is to be around and about certain general principles of the survey rather than the details of its development and application.

The Chairman asked for complete informality in presentation and called on Mr. Henderson to open the discussion against the several questions listed above. This was done by starting with I-1, "What are the characteristics that should be used as criteria for differentiating soils?" He offered in particular the following, with particular emphasis on depth and texture of the various horizons:

1. Texture.
2. Depth of clay.
3. Organic matter content of surface soil.
4. Depth to water table.
5. Reaction (pH).

A particular point also was made by Mr. Henderson that, based on these and other soil characteristics, a detailed soil map should be made and interpreted from time to time by groupings of soil types (there are now more than 200 being mapped in the State) for particular purposes.

Dr. Collins agreed that the principal points were included but Mr. Brackeen objected to omitting structure until attention was called to its appearance in another section of the questions. However, Mr. Brackeen brought the question up again in relation to the Norfolk and Ruston sandy loams of Florida and the Bladen and Dunbar sandy loams of Alabama which he held to be quite different. Henderson was joined by Drosdoff in holding that consistency is a better term for use in these soils than structure and he proceeded to describe its relationship in the following details:

DR. DROSDOFF:

I think that consistency ranks in importance with any of those factors you have listed on the blackboard. It is true that a good many of the soils are comparable as far as consistency goes, but we do have a good many of the soils which have a different type of clay mineral in them—they have some of the swelling type clay which makes for plasticity. Thus even tho the texture might be comparable, yet because of the particular type of clay mineral, it makes it a more plastic, sticky soil when wet; and when dried breaks out into very hard lumps or blocks. We have done a little work along that line, not very much, in trying to learn what the different types of clay minerals are in the various soils, particularly in limited areas. We

do have enough information to know that there are several different types of clay mineral with different characteristics that would greatly influence the consistency. I believe we shouldn't minimize it too much; especially in our sandy soils where the type of clay present greatly influences the other characteristics of the soil type.

To this Mr. Henderson added that in some soils in which the sandy portion is of very fine texture just a small percentage of clay seems to impart as much stickiness or plasticity as does 3 or 4 times that amount where the sandy portion is quite coarse.

The discussion then turned to the definition of "topsoil" and of profile relationships that can best be followed in the exchange of the original context:

Mr. Henderson:

A problem that has occurred to me quite often is that of describing soil horizons in what we call "everyday terms". To illustrate what I mean let us go back to our A, B, C terminology. In an ordinary Norfolk sandy loam we have the gray "A-1" horizon; underneath that a grayish yellow "A-2" horizon; and, finally, the yellow "B" horizon. Some of our reports list that A-1 horizon as surface soil and the A-2 as upper subsoil and the B horizon as lower subsoil. It seems that it would be well to develop a consistent terminology for describing these different horizons. We might either adopt a "surface soil," "upper subsoil," and "lower subsoil"; or "surface soil," "surface subsoil," and "sub-surface soil." It seems to me that standardization in some form is highly essential and very desirable.

Dr. Collins:

I think that consistency would determine to a large extent which it is, i.e., the subsoil or topsoil. Subsoil is usually heavier than topsoil.

Mr. Henderson:

To illustrate what I had in mind, a typical Norfolk sandy loam has a layer of yellowish-gray or grayish-yellow loamy sand beginning 4 to 6 inches beneath the surface and extending downward until the clayey subsoil is reached. What should this layer be called in common terms?

Dr. Collins:

Lower topsoil.

Dr. Drosdoff:

I usually think of that as sub-surface.

Dr. Collins:

What do you mean by sub-surface? The terminology in soil survey reports is confusing as might well be expected with 100 to 150 men writing them. If you use organic matter to differentiate topsoil from subsoil I feel that this layer should be called subsoil.

Chairman Volk:

It seems to me that topsoil should be thought of as that portion of the surface soil which, under tillage, becomes a homogenous soil. That is common terminology among the farmers and we have got to stick to that or we will run into difficulties. That is what is referred to as topsoil, rather than A-horizon, in my mind. Below that is the subsoil. Those two terms do not have any specific relationship to the profile description based on the A, B, C terminology.

Dr. Collins:

The undisturbed soil is the only place where you can get your A-horizon subdivision accurate. The question with me is, "where does the topsoil stop and the subsoil start?"

Chairman Volk:

It seems that topsoil and subsoil are general terms not applicable to the specific terminology which we hope to use in our scientific descriptions. Probably it might

be well that it remain that way. You might leave it as a part of the farmers' terminology and accept it as such; otherwise, we are going to run into considerable difficulty. I have heard this same type of discussion recently, and there just isn't any answer to it. "What is topsoil, etc?" You run into it in engineering. They also make a mess out of it in that field.

MR. HENDERSON:

I think that a problem of this kind cannot be settled all at once, but I do believe that there is a place for development of consistent terminology for describing these soils, particularly those where you have a sandy layer in between the upper soil which contains organic matter, and the clay subsoil. That should have a name, and it should be used consistently by all who write reports, for the sake of uniformity if nothing else.

DR. COLLINS:

I think the big question is this: the soils people have looked at the soil as a natural body or result of geological formation in connection with the activities of the climate, and they describe it as such. The farmer looks at it as a medium for growing crops and he thinks of everything he works as topsoil, and the part he doesn't disturb as subsoil. We have got to describe it from both a scientific standpoint and a practical agricultural standpoint, and I think we have got to go one step further in soil survey work in making a map for the soil scientist and one for the practical agriculturalist. I believe that we will come nearer to solving it that way than in any other. I made that statement before a meeting of Section 5 of the Soil Science Society of America and got cussed out by everybody. The agricultural economists said the soils were not simple and they could not be expressed in simple terms. I think the farmers would like it in simple terms. If anybody uses it, it will be the farmer, and it should be in such a form that he can understand it.

CHAIRMAN VOLK:

Do you look upon it as based upon the detailed survey maps? What do you think of a practical soils map for use by the farmer?

DR. COLLINS:

I think the Soil Conservation Service calls it a utility map and others call it a land classification map.

At this point in the discussion Chairman Volk suggested that Mr. Henderson continue with the general list of specific questions before the discussion becomes too general. Mr. Henderson then reviewed the list and suggested that instead of going through them routinely it might be better to discuss such as appear of greatest interest.

DR. COLLINS:

I should like to hear some discussion of No. I-6—"Should type names within a series be determined by the texture of the surface soil, or by the depth of the clayey subsoil, or by a combination of these?" This is an important question though it goes back to the same one raised a while ago. It is my contention that the soil type name should be determined by the top soil.

MR. HENDERSON:

My thought has been that in the Coastal Plain very often a Norfolk sandy loam, or some similar soil, is described texturally about like this: 0" - 6", loamy sand; 6" - 18", loamy fine sand; 18" - 36", sandy clay. Nowhere in such a profile description is fine sandy loam mentioned. I went thru school here without ever knowing that in the Coastal Plains the type name of some soils is not based on the texture of the surface horizon. That is how much prominence is given to it in literature.

DR. SMITH:

I am not a soil surveyor, but I have to teach soil surveying in my General Soils Course. I give my students the common definition of a soil type as uniform in all of its profile characteristics wherever it is found, and then take them out in the field and ask, "well, what is this soil type?" They say, "that is an Arredonda loamy

fine sand; and I say, "No, that is Arredonda fine sandy loam because it has clay within twenty-four inches of the surface soil and cannot be called loamy fine sand even though it has a loamy fine sand surface soil." They reply, "Now you have changed the definition without telling us." That is the way the students feel about it. If we are going to make a definition of a soil type we ought to stick to it. If the depth to clay is important (and I am not questioning that it is) we should be able to recognize this characteristic without confusing the definition of soil type.

MR. WINSOR:

It seems to me that soil type designations, as presently used, are very confusing, especially in this State. Thus the conditions in texture presented by the Norfolk series covers a very wide range in our land use capability classification. For example on "A" slopes, Norfolk sandy loam is considered as Class No. 1 land, the loamy sand as Class No. 2, and fine sand as Class 2 or Class No 3 and sand as Class No. 5. That shows a marked difference within one soil series. Possibly, as Dr. Smith pointed out, there may be several soil series involved in such a wide range that have never been separated. That is the way the mapping is carried on regardless of the definition of soil type. The fact of the matter is that the depth of the clay is the most important consideration in separating the types mentioned.

DR. DROSDOFF:

I think the question that has been raised here would, by its solution, probably rock the very foundations of our system of soil classification. I started surveying in the north and mapped soils according to definition. If a soil had a silt loam surface, it was mapped as a silt loam. If it had a fine sandy loam surface it was mapped as a fine sandy loam. In most of these assignments soil types were mapped according to definition and it worked out fine. When I was sent south and worked with Mr. Brackeen in Alabama I soon ran across Red Bay fine sandy loam and it had a loamy fine sand surface. I started asking questions about that and soon found out that you just didn't talk about those things. I asked some of the Inspectors about it and I got various stories and answers. There is a history behind the thing and to appreciate and understand the situation you really have to go into its background. From the very early days of soil survey when they were floundering around trying to arrive at certain characteristics which differentiate soils, they placed particular emphasis on certain characteristics which they thought were most important at the time, but which, at the present time, we don't think are of particular importance.

A case in point is the Norfolk Series—Norfolk fine sand and Norfolk fine sandy loam. We would never dream today of putting two such widely different soils as a deep Norfolk fine sand and a Norfolk fine sandy loam into the same series. However, we are still mapping these two soil types using that old setup. It was because Norfolk was yellow; and that to them was more important than the fact that one was a deep sand and the other had some clay underneath it. They mapped Norfolk as a fine sand all the way down. Then they found a soil which had a fine sandy clay subsoil which they could not call Norfolk fine sand. However, because it was yellow, it had to be Norfolk. So then they compromised. They figured a fine sand on the surface, plus the clay, plus a little imagination and you have a fine sandy loam. Some of the oldtimers might have a different story, but I got this from some of those same workers who told me that is the way they arrived at it in those early days. We have one system of classification in one region and another in some other region, largely because the original definition did not fit the case.

Now we find in addition to all this there is the question of what is the depth of that fine sandy clay at which you are going to call it a fine sandy loam or a loamy fine sand. I think this is a very fundamental question. Of course we cannot solve it. We are going to have to have some brilliant chap try to integrate it. Here are all these soil types which have been described in reports according to a certain concept, and we have new concepts coming in all the time. The whole thing is really going to lead us to a tremendous amount of confusion. It seems to me that the whole concept, definition of soil type, and recognition of the differentiations that are going on are going to have to be reexamined and reconstructed, and a whole new system of soil classifications developed which could encompass all of these questions in these different regions.

The chairman reminded the group that the question of erosion and the soil changes that accompany it had been raised but not satisfactorily

discussed. He asked if soils that had lost most of their topsoil were classified the same as the original. To this Mr. Joe Winsor advised that ordinarily a soil with a sandy loam surface is mapped as such. When the surface soil is removed it is mapped as a sandy loam. In reply to the question as to whether the name is changed Prof. Collins advised that it would not be in the case of the Cecil. Thus when a Cecil sandy loam loses its topsoil by erosion it is called Cecil clay or Cecil sandy clay. It retains the series name.

MR. BRACKEEN:

I would like to speak in defense of our forerunners. Those fellows had definite reasons for some of those things. For instance, take a Norfolk sandy loam. You say that it has a sand surface. What is the big difference between the surface soil of a Norfolk sand and Norfolk sandy loam? You will probably find very little. What are we going to do when in one case we have 12 inches of sand and in other instances 3 or 4 feet?

Thus the Hartsells soils of Sand Mountain usually have sandy loam surfaces and are mapped as such. In the wire grass section around Dothan, Norfolk sandy loam has a loamy sand surface. The surfaces of these two soils are, texturally, different but when it comes to productive capacity there is not much difference. The question is, should we continue to criticize those fellows so severely? They had a definite reason for developing the nomenclature they used even though they sometimes stretched a point here and there. We should adhere to their nomenclature. We are not justified in departing from it.

MR. HENDERSON:

I agree with you on that point. It seems to me that we have got to keep on using this system as developed. For instance, all of Alabama has been surveyed at least once, and a good part of Georgia has been surveyed. In Florida, however, very little has been surveyed. In most cases we could break away from this precedent if we didn't have to live with our neighbors. In Alabama if you were to go into the wire grass area around Dothan and start mapping according to definition you would throw all of those older surveys out of line.

Dr. Drosdoff suggested that the Norfolk series included too wide a range of conditions and suggested that it might be broken down into several series. As far as we are concerned in Florida if we went into Polk County and told those fellows that they have Polk sand rather than Norfolk sand they would probably shoot us. They have learned it from the survey report and otherwise, until Norfolk sand means one thing. I took one of my boys into West Florida and showed him a Norfolk sandy loam and he said "you are kidding me; this doesn't look a thing like that Polk County stuff. It has clay in it."

We have had some surveys in which the surface textures were ignored and separations were based on depth to clay or sandy clay. In these surveys a sandy loam has a clay subsoil within 18 to 20 inches of the surface; in sandy loam, deep phase, clay is between 20 and 30 inches; in loamy sands, between 30 and 42 inches; and, in sand, below 42 inches. That makes sense, but whether or not those depth separations are right nobody knows. We should adopt definite depths to clay or sandy clay for each type and stick to them whether they are right or wrong. With the situation that has developed up to the present time all we can do is to operate according to precedent and standardize as much as possible.

MR. BRACKEEN:

Are you suggesting that the standard definition of soil type should be modified to fit the Coastal Plain?

MR. HENDERSON:

I think the soil type should be defined so as to include the soil types as recognized and mapped in the Coastal Plain.

DR. DROSDOFF:

I think that you are suggesting that the Coastal Plain secede from the Union as far as the soil types are concerned. That may not be such a bad idea as a tem-

porary measure. The standard definition is indaequate. If there could be some arrangement whereby the definition for the lower coastal plain could be modified to state that soil type names are not determined wholly by the texture of the surface soil but are determined also by the depth to clay and standard depth separations that have been established, we would be well on the road to clarification of the matter. You have the same thing over in Alabama on Rus.in sand. There is quite a little of that. It is a different soil from Rustin fine sandy loam, which might also have a loamy fine sand surface.

CHAIRMAN VOLK:

It seems that the original classification was based more on soils which weren't as definitely evaluated as at present. What new system is going to be used that will actually fit the situation? The original method was devised as being something we thought was workable to some extent. We have found one phase that is not workable. What could be substituted? That phase has got to be junked if we are going to change.

DR. SMITH:

We cannot junk the idea of what a soil type is. A soil type is relatively uniform in all of its characteristics. That is where we must start from. If we try to go on any other basis it is unsound and unscientific.

CHAIRMAN VOLK:

What we need is a definition which is workable under all conditions.

DR. SMITH:

That is the only approach that is sound.

CHAIRMAN VOLK:

It seems to me that much of the unsoundness we have been discussing comes from the fact that the original classification was based on ideas of soil development that no longer particularly fit and because we now recognize other factors that are far more important in determining productivity. We must change our conception of classification. Thus we have a gradation from a sandy loam surface to a clay subsoil; where do we stop our surface soil? What *is* the surface soil? How deep should the surface soil texture be considered? It is the question we have before us when we determine how deep are we going to take the sample to determine the fertility of a soil. We are up against the same problem under those conditions.

DR. THORNTON:

If we have a Norfolk with 50 inches of sand, and another with 10 inches of sand underlain by clay the only resemblance between the two is in color. Are we going to call them both Norfolk? Wouldn't it be better to establish a new series than to try to justify keeping them in the same series?

DR. SMITH:

Any object is classified on the basis of its characteristics. We shouldn't use characteristics that may change if the classification is to be sound and permanent. The color of a soil will change. About the most stable thing about a soil is its texture. The depth of soil may change if you have rain enough. Then it would go out of one class into another. You want to get some feature that seems fairly stable. Texture is a term that has been with us for many years, and it is liable to be with us for a while yet. I don't think we ought to load ourselves down with a lot of trouble trying to fix up some other scheme to do it. Let us just do what we started out to do originally; find a definite object and put it in a definite category. If you started out to classify a bunch of marbles according to color you would make enough different categories to put them in. If some were of different substance you would not use that as a criteria; you would take some feature that would remain so that the next generation will have a category to put them in.

MR. HENDERSON:

Time is moving along pretty rapidly. This matter of depth separation can be handled. If we find enough difference in depth we can set up a new series. That is one way out. Another way would be to map the surface texture and in addition

to that indicate the depth to clay. In other words: Norfolk sand, shallow phase; Norfolk sand, deep phase, etc., with the limits of the depths set up and standardized. Another way is to use the same old system that has been in use in the Coastal Plain and set up rigid depth limits for each type within a series. Perhaps a good way to get additional ideas on this subject would be to circularize all the States that have soils in the Coastal Plain; or better still, see if Dr. Obenshain, Chairman of the Soil Survey Subcommittee of the Southeastern States might not be willing to do so.

Upon closing the discussion of depth separations, etc., the question of color relationships in field procedure was immediately raised. The Chairman asked Mr. Henderson to lead the discussion of this subject.

Mr. Henderson:

I am sure that all of you have received a copy of "Preliminary Color Standards and Color Names for Soils." I have tried to use them and found them unsatisfactory. In fact I have never examined a soil which exactly matched one of these colors. Moreover, when soil colors become "weak" or "strong," "vivid," "dusky" and that sort of thing I kind of lose touch with them. I had thought that we had reached a point some time ago where we could more or less describe soil color in simple terms and get by with it but maybe we haven't. Here at the University we brought in 72 samples and five surveyors, all of whom had worked in the state with these particular soils. We asked them to tell us what color they thought the soils were. Only two of the 72 samples were given the same color name by all five of the surveyors. There is thus a real need for some color standards. I don't think the ones we have are satisfactory, and I wonder what some of you think of them.

Mr. Winsor:

The only thing wrong was the colors selected. I think if they were applicable that field color would type all right.

Dr. Collins:

Do you think it would be possible to make color standards that would be suitable for use throughout the country?

Mr. Winsor:

I don't think so because there are some soils in the north called "red" which look faded according to our soils down here.

Mr. Henderson:

It is obvious that color standard should be developed on a regional rather than a national basis.

Following a brief recess and before returning to the discussion of color the question of relationships of geological formations to soil types was raised by Dr. John Henry Davis of the State Department of Geology. Mr. Henderson recognized the question as a good one and indicated the great need in the State for a map showing surface geology in contrast to the present geological map which shows only formations that occur at considerable depths, recognition of which apparently is based entirely upon the fossils that are found in them rather than chemical composition. For instance the Hawthorne formation ranges from phosphate sandstone and limestone to Fullers earth. Mr. Henderson went on to say "we do recognize here in the State a very definite correlation between our soils and what is under them, mainly because what is under them comes pretty close to the surface sometimes. Some of you from out of the State have been here on agronomy and other tours and have visited the Experiment Station at Homestead which is located on solid rock. Farming is carried on with the aid of road scarifiers such as are used for tearing up a paved road. Where those formations extend to the surface or near the surface

they become very important especially where they are permeable to water. If drainage is accomplished irrigation becomes a problem. So not only is the nearness to the surface important, but the porosity of some of our limestone is such that water will run thru them as readily as it will thru washed gravel. This is high permeability. Thus geology does become of great importance to a thorough study of our soils in Florida, at least in some sections." Dr. Davis suggested that if the soils men would tie in at least some of the surficial geological names and associations with the discussion of soils it would greatly help the geologist to know what they are talking about . Dr. Drosdoff inquired in regard to the disposition of the soil color question and asked if it would not be a good idea to pursue such an important phase to some definite level of decision. Mr. Long promptly asked what relationship, if any, existed between mineral content and soil color.

DR. DROSDOFF:

To a certain extent there is good correlation between soil color and mineral content. Contrasting the red and the yellow soil, it is noted that in west Florida we have the Norfolk soils which are yellow and the Red Bay soils which are red. We know the difference in color is due to difference in the type of iron oxides they contain. In the Norfolk they are hydrated and in the Red Bay they are dehydrated. We don't know why these differences develop. It has been suggested that poor drainage conditions in times past brought about poor hydration of the iron oxides and the development of the yellow color. Color in itself does not mean much; it is mainly a reflection of certain other conditions. I believe that entirely too much emphasis has been placed on color and on the fine differentiations between different colors. Take Red Bay, Rustin and Norfolk sandy loams, for instance, a group of soils which range from red to yellow in the subsoil. I have yet to see any statistics showing any difference in productivity under comparable management conditions among those three soils. I have asked a number of people about this and they always seem to say that Red Bay is a little better soil and Norfolk is a little poorer than Rustin. They are all good soils and I don't believe we have the statistics to substantiate such statements. So we go from the red all the way to the yellow with very little difference in productivity yet break our necks to decide whether it is a brownish-red or a reddish-brown. Arguments have gone on for hours in an effort to reach a decision whether it is such and such a color, when usually it doesn't make a particle of difference.

Consequently, I think we should simplify these soil colors. They are, at best, only a relative matter. When you are mapping up north with those dull colors and come across something that is a little bright and reddish you call it "red" because it stands out; down here it doesn't show up, but that is natural. A boy who was working with me got transferred to the Panama Canal Zone. He thought some of the color tones here were pretty dark but when he came back on furlough he said "Gosh, these color tones are certainly light." His concept of color had changed. I think we need simplification. We ought to recognize the whole question of color psychology and certainly we want to do away with such individual expressions as "mouse gray" and other pet terms and in this way simplify the whole color scheme.

MR. HENDERSON:

I am in complete agreement. As a matter of fact soil color is another of the several questions on which we may want to express ourselves in an official way before the close of the meeting. I have been wondering what would be the best way for us to do this. Perhaps we can discuss that question among ourselves during the lunch hour and arrive at some definite suggestions. We may want to just let this be the beginning, circularize all the other States in the Southeast, and then make up a definite recommendation; or we may want to make a recommendation of our own. I think some very good points are being brought out in our discussion here and certainly hope that some way can be found to make them a matter of record in a worthwhile manner at the proper time.

The Chairman noted the time was drawing short and suggested that if there was no further discussion of soil color that the question No. I-20 be next taken up—"Should Slope be Shown on All Soil Maps."

MR. LONG:

Won't the geodetic survey of Florida show that?

MR. HENDERSON:

You would have to interpolate slope percentage from the distance between those lines. Some of our soil maps show both soils and contours. In the case of air drainage, contour lines would indicate the general trend of cold air currents and the location of cold air pockets. Contour maps would be poor substitutes for slope maps.

MR. LONG:

Would it be possible in making a soil map to indicate those rivers of air? For example, in winter there is a very definite river of co d air that comes down thru the State. On both sides of that current we don't get the damage that we do within it. Would it be possible to locate such an area on soil maps?

MR. HENDERSON:

Contour lines tell more about that than slope as it is being shown on our soil map. Mr. Winsor, do you wish to discuss the mapping of slope on the basis of conditions here in the State? Do you think there are any conditions where slope should not be mapped? To what extent should slope be mapped?

MR. WINDSOR:

I will describe briefly how we are mapping slope. We have slope groups and they are shown by capital letter. "A" slope might be 0 to 2 percent, and "B" might be 2 to 5, and "C" would be 5 to 8; "D" would be 8 to 12; "E" would be 12 to 17 and "F" would be over 17 percent. The percentage is expressed in how many feet of rise and fall take place in a 100-foot horizon.al line. We map slope because percentage of slopes are significant factors in planning proper land use. With a given soil, increases in slope greatly accelerate soil erosion and water lossage. The two go together.

Erosion is also mapped and we express that in percent of topsoil moved. We express this by numbers: 0 erosion, no apparent erosion; No. 2 erosion, 25 to 75 percent and up to 25 percent of the subsoil removed; and No. 3 erosion, 75 percent or more topsoil and up to 75 percent of the subsoil removed, etc. Erosion is an important factor in determining what conservation practices should be carried on.

Furthermore, soil as such never occurs by itself. The conception of a soil type is all right and it is necessary, but as such it never occurs by itself. A soil always has slope or lack of slope, and erosion or lack of erosion. They are external factors, but important, nevertheless.

DR. DAVIS:

How do you determine slope when you do not have topographic maps? There are so few in the State that are reliable.

MR. WINSOR:

We have an Abney hand level that reads directly in percent slope. It is a very rapid means of determining slope and it is accurate within about 1 percent. It might be interesting to note that the scale of the map we are making is 4 inches to the mile. This gives 16 times the area of the old published survey maps. These maps show a good bit more detail than those of the earlier surveys.

MR. HENDERSON:

There is a question that I have in mind which goes back to our original question regarding depth to clay. I had thought at times that a detailed soils map should be rather permanent, based on permanent features. That being the case, I have wondered if, in addition to showing soil type, we might not show ranges in slope for each soil type on a soil map. Erosion is something that very often takes place overnight. Therefore, if we make a soil map which we consider relatively permanent and show soil erosion on that map, giving it an equal status to soil type, I wonder

if we aren't going a little too far. If you had erosion on our Norfolk loamy sands and it erodes 6 inches off the top it might convert it into a fine sandy loam, and then our map would be out of date.

DR. COLLINS:

It would also change your slope too and your soil type.

MR. HENDERSON:

We should have a soil map that would reflect the permanent condition in the area.

## AFTERNOON SESSION

In resuming the session following lunch Chairman Volk reminded the group that only a comparatively few of the questions pertaining to the survey had been covered according to the outline and more speed would be necessary. He then called on Mr. Henderson to take up the question of inspection and correlation of soils in the field.

MR. HENDERSON:

I recently heard about a certain committee that had gotten together to decide on something over which they had no authority. That is pretty much the situation we are confronted with here as regards the second phase that we arrived at just before lunch. Nevertheless I think we can discuss it quite fully without hurting anybody's feelings too much.

As regards this question of inspecting and correlating soils in the field I should first tell you that here in Florida we have two Inspectors operating and the division line is the Apalachicola River. The soils on both sides of the river are similar. Under such conditions it seems that it might be desirable for us to have only one Inspector for the entire state; or, if we are to have two Inspectors, place the boundary line at some other point. Thus the Suwannee River might make a better dividing line than the Apalachicola River. Inspectors are human beings like I presume to be myself and like all soil surveyors. Therefore they are subject to having opinions of their own which sometimes are not shared by their colleagues. Very often we find that Inspectors don't get together out in the field, a really serious weakness in the inspection setup.

Perhaps the situation in the adjoining states is somewhat different. The breakdown between inspection areas may be based on physiographic differences. One inspector might have the Piedmont Plateau, another the Coastal Plain and still another the Limestone Valley. However, here in Florida no such convenient division is possible. I doubt if it is desirable to ask for opinions on that particular point. We will consider the next question instead. "Do you think there is a tendency to establish too many soil series?" Here in the State we were quite inactive over a period of years; in fact, not a survey was made between 1925 and 1935; and not many were made prior to 1925. Since the latter year we have started surveys in many parts of the State that had not been touched by surveys before. As a result of expansion of the work, or revival of it, the number of recognized series in the State has been more than doubled in the space of seven or eight years. Some of the fellows who attempt to use soil survey information seem to be very much confused by these new series. I have wondered at times if we were taking it too far, or, if not, whether we are defining each new series closely enough so that it really means something.

Those are thoughts on which I would like to hear some expressions of opinion.

MR. MCMULLEN:

I don't know—there are already so many I can't remember most of them, so if you add some more it won't make much difference. As far as we are concerned in Florida we have a good many closely related soils; but it may be necessary to name some new ones now and then. I know there are people, County Agents, for instance, who know but few of the soils. I think if I were to speak for the County Agents I would say that the smallest number of series that is absolutely necessary would be the desirable number.

Mr. Long:

How many series have you now, Mr. Henderson?

Mr. Henderson:

At present we recognize about 102 series in the State. Under each series we have one or more types, which runs the total up to about 200 types.

Mr. Long:

Don't you think that number is confusing?

Mr. Henderson:

I think you have a very good point there. We will touch on that question later on in the discussion of the soil survey report.

To re-state what I said this morning about the mapping out in the field, I don't feel that we can make the basic detailed soil map in too much detail. For ourselves that is impossible. One fundamental weakness, I think, in soil surveying, is interpreting our information after we get it. In the first place there is not a whole lo of information available on individual soils. Since it doesn't exist on the individual soils, how do we know that one soil is the same or different from another in respect to land use? First of all we can define characteristics which we use as a basis for a map; we can use those characteristics as a basis for defining a soil type; and soils men know what that type means. It remains for all of us to work out the true value of each soil from the standpoint of land use or land management requirements. That particular phase we will take up in detail later in Prof. Collins' phase of the discussion.

The third question under Section II is: (I am going to go thru these hurriedly because we still have some important ones to cover) "Have some of the new series 'eaten up' some of the old, well-established series?"

I believe you mentioned a while ago, Mr. Brackeen, that most of the DeKalb soils in Alabama are now called Hartsells soils. I wonder if there is any reaction to that kind of change.

Mr. Brackeen:

As you people may know the DeKalb series was first recognized in DeKalb County, Alabama in1904, and was later mapped in a number of Northern States. After about twenty or twenty-five years it was discovered that the DeKalb soils in Alabama were not like those mapped farther north. It was decided to make a breakdown. The soils which many of our people in Alabama had come to know as DeKalb were renamed Hartsells. There was considerable objection to this on the part of our Experiment Station workers, who claimed they could not keep up with a system like that. Of course we could not do anything about it because the change was made by the Bureau of Plant Industry and we had to cooperate with them. We have also had other changes. Thus the Elk type has been changed to Edelward. In all instances there is considerable comment by our associated agricultural workers, especially at the time of the change.

Mr. Henderson:

I think those remarks bring out very well the situation we have. It indicates that we should be very careful in setting up a new series because very often we find that old, well-established series may be consumed by them.

Mr. Brackeen:

We have another one—what we used to called the Houston series, is now called the Hunt. It is going to absorb 75 percent of the Houston. That is a black belt soil.

Mr. Henderson:

I have no specific information on your Black Belt soils but I understand that they have been eroding as no other soils have. I wonder if it resembles Houston.

Mr. Brackeen:

No, the Hunt is quite different. The Houston has an alkaline reaction. The Hunt is acid in the lower subsoil.

Dr. Drosdoff:

What are the basic, underlying reasons for shifting from one series name to another? I think if we get at the basic causes for that—one soil ea ing up another series—we might have some idea of how to prevent that situation in the future.

Mr. Brackeen:

Is it something that should be prevented; or is it desirable?

Dr. Drosdoff:

It seems to me that if DeKalb had been properly defined in the first place and you had had proper definition of its characteristics, its distribution would have been limited. Probably the DeKalb series sort of got out of hand; the range in characteristics got away and, changing with different Inspectors, it soon got out of the range of the original definition. Consequently the range got so great that you had more of that soil outside of the original concept of the series than in it. So it seems to me that basically there was something wrong about that original set up of the definition of the series.

Mr. Brackeen:

It was a climatic change; quite extreme from South to North.

Dr. Drosdoff:

Yes, but if when the series was set up someone had said, "Now if you get over so much clay in the subsoil, or whatever differentiates DeKalb from Hartsell, it is no longer a DeKalb."

Mr. Brackeen:

That is where the Inspectors slipped.

Chairman Volk:

Are you in favor of phasing or of establishing new series to take care of such differences, when recognized, as are certain to develop out of ordinary progress, many of which may be definitely important from productivity standpoint?

Dr. Drosdoff:

That all depends on whether the phase would be all right. There again it depends on how you want to define phases; how particular your series differentiation is going to be; and how you are going to limit the phases. In other words, it goes back to the basic principles used in establishing series and phases.

Chairman Volk:

To be right to begin with doesn't allow for the normal human error, and some recognized method of change must be provided for.

Dr. Drosdoff:

That's right, but there is so much of this in every state, and so many of the soils are affected that it makes one wonder whether our basic principles in the original establishment of some of the soils were correct.

Mr. Henderson:

Along that line it appears that it is definitely established tendency to make the definition of a particular series more restricted all the time, thereby eliminating the number of types and phases within a given series. In other words we are now mapping 205 soil types in 102 series whereas the same number of soil conditions were formerly mapped in less than 30 series. Instead of phasing, the tendency is to set up a new series; and that gives a new name. There are arguments on both sides as to whether we ought to have new names, or whether we ought to indicate these differences by phasing in a well established series.

I will make a few remarks on questions 4 and 5 (under Div. II in your outline) and leave it there, unless some of you want to carry the discussion a little further.

On field inspections where there are a number of workers ranging all the way from inexperienced field men up thru the Inspector, good discussions that might be had are not had for the simple reason that these fellows who are in between these two (the bottom and the top) don't like to express themselves—for obvious reasons.

One reason is that they don't like to argue with their superiors in the presence of their subordinates. There should be a way to handle the situation so that a good discussion may be had which will eliminate at least some of the mistakes that are often made. I am wondering if it wouldn't be a good idea if the Federal Inspector had an assistant in each state for close supervision of the field parties. With such a setup the Federal Inspector would have no direct contact with the field parties.

Since there was no evidence of further discussion on the question of field inspection Chairman Volk asked Prof. Collins to take up Division III of the Outline and open the discussion of the classification and grouping of soils.

DR. COLLINS:

I think I made a statement this morning that should take care of at least a part of this discussion. I hold that the soil survey is a technical activity for soils information, primarily for soils people. I like to look at it in the sense that a doctor keeps up with scientific development in the field of medicine. Certainly he doesn't expect his patients to know scientific medicine like he does, but expects them to be well enough informed in the field of sanitation and general dietetics and nutrition to be able to appreciate a good form of living and take reasonably good care of themselves. Thus with some of us soils people, we have expected non-technical people such as County Agents, agriculturalists and others to take these soil maps and use them just like we would; and I don't believe they can do it.

I heard Mr. Henderson and Mr. Brackeen both make a remark at the lunch hour and I am going to repeat it. They said the County Agents do not use soil survey maps. I know that is true in my State and I have made that statement in the presence of County Agents. They say we have too many soil series and types and they don't mean anything; that they cannot recognize the difference in them. Dr. Smith said this morning instead of having so many types we should have a new series. I don't think that would help to any great extent for the simple reason that we would still have the divisions to contend with.

Now the answer to that, insofar as Soil Conservation Service is concerned is land use capability grouping of soils to give a more simple classification to the farmer and technicians in soil conservation work. The Bureau of Plant Industry is doing considerable work at the present time on soil association maps, which I think are designed for the same purpose, to eliminate so much detail on soil survey maps. The agricultural economist has developed land classification on an entirely different basis. So if you review all of these surveys and classifications there may be some duplication, but in the final analysis I think all groups are working with the end in view of giving the farmer, as well as the technical agriculturalist, an effective basis for land-use planning. I have got some pretty definite ideas about it, and I don't care about making anybody mad, but I don't believe there is as much difference in the opinions of these people engaged in these activities as they sometimes try to lead others to believe.

Mr. Brackeen, I would like for you, if you will, to express your opinion on land classification or land use capability classification.

MR. BRACKEEN:

I have two or three things in mind. Some remarks already have been made about our Soil Association work in Alabama. This is along the line that we are talking about now (produces bulletin and related map on the subject). Do we need a new series? I would hate to say no. I think sometimes we do need them but I think we need them for the soil specialist to use; that a new series is not for *the practical worker*, but for the soil technician to use in the development of an interpretative map for the agricultural worker.

As an example of what I mean, this is a detailed soil survey map of Limestone County. The map is on a scale of 3 inches to the mile. It takes 74 or 75 sheets to cover the county. There is a lot of detail on it that cannot be apparent at too great a distance. The soil technician needs all the detail, but an agricultural worker such as the County Agent does not need it and cannot use it. About all he is going to refer to is the color, which is a simplified soil map. I think I have 14 colors covering this County, when it has about 250 details. I do think that the detailed soil map is important to the fellow who is going to develop other types of maps.

A certain classification might suit one group, but another would be better for another group.

MR. MCMULLEN:

What use do you expect the farmer to make of that?

MR. BRACKEEN:

I will give you a definition of one of our groups. He should understand it. (Reads.) As you see, we give very simple, laymen descriptions of each of these color groups, not the detailed soil groups but the ones you can see from where you are. Of course, the colors don't answer all their questions, but we think it is a good approach to get the farmer or County Agent to more easily understand what we have done and are trying to do.

In other words, detailed soil maps of counties have been prepared for several years in Alabama. These maps show soil type, slope and erosion in great detail. For the technically trained agricultural worker and for other individuals who are willing to analyze minute detail, these maps are of inestimable value in that they may be interpreted in the form of different types of agricultural maps. This being true, it was decided by the agricultural agencies working in Alabama, including the Extension Service, the Experiment Station, the Soil Survey Division, the Bureau of Plant Industry and the Tennessee Valley Authority, to prepare *soil association maps* on which areas having similar soils, slopes and erosion conditions are shown as a group. Maps of this character showing areas having similar management problems, fertilizer requirements, similar slop ranges and soil erosion problems are placed in a common group. A map prepared on this hases of any particular county contains not more than 15 different soil groups. Such maps have been prepared for 15 coun ies in Alabama and others are requested by county agents and other agricultural workers. Within the next three years it is anticipated that all counties of Alabama will be covered by such maps.

Several objectives were foremost in the minds of agricultural workers when preparing these soil association maps. Firstly, it was the thought to show on such a simplified map the agricultural problems or absence of agricultural problems in a particular community. Secondly, it was the idea to indicate those areas so that any agency desiring to establish a certain type industry would know where the industry could be best located. Thirdly, the objective was to acquaint new agricultural workers coming into a particular county with the general conditions of the county without the necessity of driving the county in detail. Fourthly, it was a part of the plan to relate the production of various essential war crops to the land area thus arriving at the best possible estimate of the maximum yields to be expected of a particular county. In addition to these several objectives, these generalized maps are a great aid to the agricultural workers in interpreting the detailed soil maps. Many other objectives or uses for these maps could be mentioned; however, those enumerated seem to be the most outstanding.

DR. COLLINS:

Mr. Winsor, do you have any comments you would like to make at this time with reference to land classification?

MR. WINSOR:

I don't have much to add except to say that I consider land use capability classification a rather simple means of summarizing the factors of soil slope and erosion in terms of proper land use management.

MR. HENDERSON:

Mr. Brackeen has described one interpretation, and as I gather, a rather general interpreation of a detailed soil map. As he said, there is nothing more important as a basis for making such maps than the detailed soil survey, and, as all of us have generally agreed, soils men are usually the ones that make the most use of a detailed soil map. Well, we don't want to be selfish with our information, so I think the best way to get somebody else to use it is to convert it into just such interpretative maps. There is a general interpretation which can serve a number of purposes, and any number of interpretative maps could be made for a wide variety of specific purposes at any time.

Here is another thought that has occurred to me. If we have a good detailed soil map and preserve it, its use may extend over a number of years. During that time we may find additional land use differences between soils that we didn't recognize in the first interpretation. Rather than go out and make another detailed soil map in order to bring this new information into the picture we should make the map as detailed as possible in the first effort and then reinterpret it from time to time as new information regarding the individual mapping units come to hand. The saving and convenience of such a procedure could be very great.

DR. COLLINS:

I don't think we have reached the maximum number of soil separations as yet from either a scientific or a practical standpoint. In DeKalb County, one of the first surveyed in Georgia, only four of its soil series have been recognized in Fulton County, which adjoins it, and is being surveyed at the present time. It probably has sixty soil series and phases that are being mapped. I feel that the soil scientist should never stop reworking an area or reclassifying its soils. I fear that some of us are prone to think that we can complete a soil survey and have an accurate index to all the knowledge that is tied up in the soil. I don't think we will ever be able to do that because our agricultural practices are changing the soil's condition.

Does anybody else have a comment they would like to make? I think that the soil scientists are making productivity ratings on a sound basis. In the counties where they have been made they seem to express productivity relationships very accurately.

That, it seems to me is an adequate answer to Question No. III-2, "Are the 'land-use capability' classes developed on a satisfactory basis?"

We will now take up Question No. III-3, "Should a standard type of land classification be developed or should the problems and characteristics of the area in question determine the type to be used?"

I am going to give you my candid opinion. I think the land classification map made in Florida ought to be determined by the people in Florida who are going to use or direct its use. The same in Georgia and Alabama. I don't think anybody ought to ram down your throat some classification that you don't want or cannot use, or don't need. As a matter of fact I think that discussion and determination of such problems is one of the important purposes of this meeting.

MR. BRACKEEN:

Before making the Soil Association map that I showed you a while ago we went to the County Agents and asked them to group the soils for us. Of course we led the discussions and pointed out the various agricultural conditions represented in the county. We would ask "are those two soils enough alike to place them together in a group?" We let them do their own grouping and we interpreted their grouping. When we got thru we had a usable map.

DR. COLLINS:

We have a State Land Use Committee composed of members of the Agronomy Department, Extension Service and the Soil Conservation Service, and we pass on land use capability tables of all Soil Conservation Districts in the State. In this way we have an opportunity to review and express our opinion on those land use capability classes. In this work I think that the Soil Conservation Service has done a pretty good job. It is not perfect by any means but progress is being made.

If there is no further discussion of question 3 we will now take up question III-4: "What factors should we use as a basis for general land classification?"

I think it has been pretty well brought out that the detailed soil survey ought to be the basis for at least a part of it. As for a broader concept, I think all agronomic and economic factors should be considered. If anybody else has a factor to bring in I would like to hear it.

MR. BRACKEEN:

Please elaborate on the agronomic phases.

DR. COLLINS:

Crop adaptation, fertilizer requirements, soil management, etc. If there is no further discussion of that general subject we now come to the last question of Section III of the outline, No 5, "Should a land classification map be superimposed on the detailed soil map?" My reaction to that question is "positively no." I think

it should be a separate map but based on the detailed soils map. If we put too much on one map it is hard to find anything.

MR. BRACKEEN:

Do you think that a color grouping, according to agronomics, should be imposed on a detailed soil map? In other words, let us consider that in our detailed soil maps we have some grouping in order to simplify the number of colors used. Should that type of grouping be based upon agronomics and simplified further than at present?

DR. COLLINS:

Yes, I think it should be.

MR. BRACKEEN:

Frankly I think that is a very fertile field. The first grouping ever done in Alabama was in Hall County and it was a physiographic grouping. The color grouping was based largely on physiography. Of all bases upon which soils can be grouped that is the worst. Soils of terraces which agronomically were similar were kept separate. If we based our groupings on agronomic possibilities we would have something. If the basic groupings had been on agronomics we would have had a more useful map. Physiography is the poorest basis for grouping soils that we have ever tried to use.

DR. COLLINS:

As I recall physiography has been used in the case of some maps.

MR. BRACKEEN:

Two similar soils: Norfolk and Kalmia, were shown differently because of differences in elevation. That kind of grouping, I think, is very poor. We should have used a grouping based on agricultural possibilities, fertilizer requirements, management problems, etc.

DR. COLLINS:

I think we all must remember that the making of land use capability or soil classification maps is not one man's job. The soils people develop the groupings and then the plant and animal people should be brought into the picture. The completed map should answer the needs of all of these people and I think they can contribute a great deal to its finished value if consulted during its development. Of course we should also consult the land economists, too.

I believe that about completes the questions under soils grouping and land classification unless there are other points to be raised.

MR. HENDERSON:

Mr. Chairman, before we go into the discussion of the Soil Survey Report under Section No. IV of our outline I would like to make a few remarks regarding land use capability classification as it has developed here in the State. Some problems have developed since the idea of land use capability classification was born. As originally conceived, at least so it seems to me, land use capability classification reflected mainly those practices which were necessary to prevent soil erosion. Since that time, particularly here in the State and perhaps in some of your counties in Georgia and Alabama, Soil Conservation Districts have been established in areas where the primary problems of soil management are not erosion control.

Naturally, as you extend the area of your influence you meet new problems, and when you meet a new problem you try to solve it. I wonder if some of these developments are not broad enough that they might well be considered in all of the Southeastern States. For instance the Soil Conservation Service is recognizing the basic eight capability classes in which erosion control is the main problem. In addition they have sub-groups in all these broad categories for sandy soils where organic matter maintenance, or fertility maintenance is the main problem. Other sub-groups take care of those soils in which drainage is a primary problem. I am wondering if you have had any experience in your State with these new classifications.

MR. WINSOR:

To go a little further, up until about a year ago Class 3 land was defined as land suitable for cultivation with complex or intensive practices. By examining that

definition and the soils that occur within that capability class, you could discover soils on which erosion was the chief problem, like those in West Florida; soils that were too wet for cultivation in their present state, but yet had good agricultural potentialities; and also good sandy soils which, with good soil improvement practices, are suitable for cultivation. That includes a pretty wide range of soil conditions for a single land use capability class. Since those classes are shown on maps by colors, if you had a map with a red area indicating Class 3 land, you could not tell by looking at it whether soil erosion, drainage or soil improvement was the primary problem. However, by breaking it down into sub-classes the new sub-class 3-A will take care of those portions of Class 3 lands which need drainage for cultivation, and the sub-class 3-B would take care of the sandy soils which need soil improvement. The colors for use on the land use capability map were set up so that the solid colors showed those lands that needed erosion control; the solid color with horizontal hachure those that needed drainage, and the solid color with vertical hachure those that needed soil improvement. In doing this we simply took care of the diversity of kinds of land that occurred in any one class. It brought the different problems out much better.

Mr. Brackeen:

I criticized the early land use capability maps because they failed to show the exact nature of the soil management problems. With such a system as Mr. Winsor has just described I can see a wider and better application of land use capability classification. We all know drainage and erosion control are two different problems. Breaking the classes down does make the map mean a great deal more.

Chairman Volk asked that further discussion of any phase of Section III of the outline be withheld until Section IV, The Soil Survey Report, had been covered. He then asked Prof. Collins if he would conutinue to lead the discussion through this section and the six questions involved. For this listing please refer to your original outline, page 19.

Dr. Collins:

In opening the discussion on the Soil Survey Report I am going to make this comment. Since it seems to be the consensus of opinion of the gentlemen from Alabama, Florida, and myself from Georgia that the present soil survey maps and reports are not used to any great extent, I think it would be logical to assume that they are not meeting the needs of the practical agriculturalist. They may be adequate for the soil scientist, but not for everybody. Are we going to educate the agriculturalists to the soil scientists' viewpoint, or are we going to make two reports? I think it is going to take two reports. I don't think that it would be necessary to publish the soil survey reports or the detailed soil survey map of the county in large quantities. However, the practical land use capability map or the soil association map and the practical report should be made available in sufficient numbers to meet the needs of anyone in the area who might want a copy. That is my opinion on the soil survey report side of our discussion. I also think the reports should be standardized at least for a given area and possibly for a given state. I can conceive of a good deal of trouble arising from adjoining counties having two different types of report. They should be standardized by all means to avoid such confusion. Does anybody have any comment?

Mr. Windsor:

For some reason there always has been a long lapse of time between the completion of the survey and the actual publication of the report. In the Soil Conservation Service in this region we are trying to work out what is called an "interim report" which usually will be completed in thirty to sixty days after the county survey is finished. It is briefer and written in more informal terms. It is mimeographed as soon as available and distributed to workers and to farmers who want it, pending the time the more elaborate reports come out which usually require 4 to 5 years. The interim reports point out the land use changes that are necessary in the county and the way we are going to try to make those changes.

Dr. Allison:

In undertaking to write a soil survey report for the technical man as well as the practical agriculturist I am wondering if it would not be possible to put into

it all of the practical information that is available and desirable and place most of the technical material (whe her it is series and profile descriptions; definition of terms or large tables of data), either in the footnotes or in an appendix position. I feel there is a lot of room for thought in such a proposition. In the long run such a procedure would reduce the cost of publication and serve the purpose of keeping practical information and technical data together. If the practical individual is inclined to get a little more technical than usual he doesn't need to go searching and hoping to find another bulletin. Furthermore certain types of our growers in Florida are able to read and understand quite technical terms whereas others are not. In any event the more capable of them do not want to be "spoon-fed". As a matter of fact the improvement of this situation was the very reason for setting up the terminology committee in the Society some time ago. For its "job description" see Proceedings Volume I—p. 63 (1942). Going back to the question of the reports, even if they were combined under the same cover they would still be two separate reports. The man who did not want the technical report would simply not have to read it and vice versa.

Dr. Collins:

Like a good many of our agricultural men?

Dr. Smith:

You have reference to a State report on a county in addition to the U. S. Bureau report?

Dr. Collins:

Not necessarily. I think the Federal agency, regardless of what agency it might be, will publish the kind of report the state wants when they find out what it wants. After all the Federal Government is contributing its effort for the benefit of the people who live upon that soil, and I am sure that the Soil Conservation Service and the Bureau of Plant Industry will cooperate in giving the people of the various states the kind of maps and reports they want. I have had enough dealings with both agencies to know that is the attitude they have expressed.

Dr. Smith:

Wouldn't there be an advantage to having a state report of a county? For instance, after a survey has been made—and it is only then that you can—set up field experiments on different soil types, carry them on for a period of years and then make a state report which is of more value to the farmer than the original survey report.

Dr. Collins:

We have followed that in Georgia for probably fifteen years. The Bureau of Chemistry and Soils and the State, in cooperation, surveyed about seventy-five of the one hundred and fifty counties in Georgia. Then the State took samples of soil from different soil series and types, made complete chemical analyses of them, and then made recommendations as to the best uses of these various soils bases on physical as well as chemical characteristics. I think that was a good plan myself, and well worthwhile. We did not prepare a land classification map but we did have extra copies of the soil survey map which we sent out with the State report. However, that practice has been discontinued in the State due to the financial situation.

Mr. Brackeen:

You didn't answer that 6th question.

Dr. Collins:

I did indirectly. I said, "Are you going to educate the agriculturist to the soil technician's viewpoint, or are you going to give them a report they can understand?"

Chairman Volk:

The experience of the Soil Conservation Service is that education is almost impossible; you have to give the farmers something they can understand.

Dr. Collins:

I think the education approach would be more desirable if we could do it.

Mr. McMullen:

I would like to say in that connection it seems to me that the problem that the soils people have now is taking this very valuable information that is being developed on soils, which comes out as a result of soil surveys, and putting it in o understandable terms that the county agent or the farmer or even I can understand. The big challenge in the whole thing, it seems to me, is putting that information in terms that can be readily understood, or can be understood without an awful lot of study that those folks are not going to undertake in order to get at the information. Thus the discussion this morning was above me completely. I just missed the point, boys, that's all there is to it. I know those points must be considered in making the survey. I don't doubt but what those things are as complicated as the discussion indicated they were. Personally I don't want to have to learn all that stuff in order to be able to tell farmers about the profile of an Orangeburg or a Norfolk soil and the manner in which it should be handled. We have just completed a report on soil conservation needs in Florida for the State Planning Board in which all our recommendations were based on soil survey information. Non-technical terms were used. The big problem really is putting soils information in'o terms that rookies like me can understand. I know that technical soils data is still basic to the development of a practical understandable report.

Dr. Collins:

As has been said before, it is not the job of soil men, alone.

Mr. McMullen:

It may be like a story I heard. Hitler called up Tojo and said, "What's the matter over ther?" Tojo said, "Adolf, what are you griping about?" He said, "You are supposed to be in Washington by November, and you are not there." Tojo said, "Adolf, where are you calling from Moscow?"

Dr. Collins:

I think you are absolutely right in your viewpoint. I made a statement this morning that was made six years ago before a group of soil surveyors, inspectors, etc., to the effect that we had to make a simplified map and report that non-soils men could understand. They replied that it was impossible to make a simple report of a scientific subject. I believe you can. I believe you can interpret it in terms that the average farmer can understand.

Mr. Gunn:

If we cannot do that, what disposition is going to be made of the material we have assembled?

Dr. Collins:

It probably is not going to be as simple as it sounds to write a report that the average man can understand. I am sure it is going to take the soild cooperation of all groups concerned.

Mr. Henderson:

I have a thought in this connection. In line of duty here at the University I have forced my services on certain people. Recen'ly I was out over thirty-three or thirty-four experimental fields located in three or four different counties. The soils ranged all the way from Red Bay fine sandy loam to Blanton fine sand An S.C.S. surveyor was with me. When we got to the Blanton fine sand and found that was the best experimental field in the bunch when measured in terms of yield, he said, "I am seeing it, but I don't believe it." What I am leading up to is this: We soils men form an idea of a soil without having production records. The plant men often place experiments without reference to soils. If we could work together a little more closely the soils men might learn soil differences are not as great as was first thought and the plant men might learn that the soil types are more important than they thought. I think that over the years, as we obtain yield data on different soils under various management practices, we will begin to learn that we were both wrong. In the meantime we can, of course, hope for at least a median trend in our thinking and planning.

Dr. Collins:

We have done some farm program planning in Georgia based on soil conservation surveys. We have a large number of vocational agriculture students and we give them instruction in land classification. After that we select a farm and let them make a map. Usually the Soil Conservation Service is kind enough to make us a map as a standard to go by. We have a group meeting and we call in the various subject matter specialists and we make a program, each one furnishing his idea of the needs. We work up plans for this particular farm and find that the farmer would have to have 15 more acres to live, yet he reported he had been making money. He said he made $900.00 profit the year before on that farm. I didn't argue with him about the sales because I thought they were right. We need a better understanding of the fundamentals of land use planning. The farm program planning certainly taught a lot of boys in Georgia what we mean by land use capability, and how to read soil maps. I find some of these boys who have gone out as teachers will send in a sample of soil that they want analyzed, and say "I think it is such and such a series and type." In checking what part of the county it came from I find they usaully are pretty near right. I think it has helped some over a long period of time. If there are no other comments this portion of the program is completed.

Chairman Volk:

I would like to cite one instance to show the importance of recognizing soil characteristics. In some nitrogen fertilization work at Hastings on cabbage we had an area which showed little soil variation as measured by characteristics recognized in the soil survey. However, when we took the yield data from the plots on that area a positive correlation was found between high yield and low moisture equivalent; and vice versa. In general, soil nitrate level was highest in soils of the higher moisture equivalent. In other words a reverse correlation between soil nitrate nitrogen and yield existed. However, plots randomized over the area showed that there was a statistically significant response to applications of nitrate nitrogen. A knowledge of the soils we were working on made it apparent what the difficulty was. On the heavy soil where there was a higher moisture equivalent we had a lower infiltration rate (this is my interpretation of it) and really an adverse moisture condition during the growing of the crop. In the typical soil we had a clay subsoil that held up the moisture. In the light soil we had rapid infiltration and good moisture relationships, but by virtue of that we had lower nitrate level. The general response was to moisture and the specific response, when randomization eliminated this, was to nitrate nitrogen. This emphasizes the importance of tying data very closely to variable soil conditions within the type on which we are working for two reasons; first, so we can recognize those differences and interpret the experimental data that we get for apparent abnormalities; and second so that we will not commit the error of making widespread application of data which is obtained on one small area of soil, on which we carry our experimental work, to a range of soils on some of which it does not apply at all. The present set-up of mobile units is a major attempt to get away from that very thing. That is, to broaden the work to a greater extent so that we have a much better cross section of yield responses to fertilization practices. But as Mr. Henderson says, a good farmer can make a liar out of any of us most any time.

## RECESS

Following the afternoon recess Chairman Volk called the meeting to order with the advice that the subject matter of the program had been covered in a general way; also that much of the remaining time could well be given to closing discussion of various questions of particular interest especially in regard to the subject matter of resolutions that had been referred to from time to time as one of the prime objects of the meeting. By way of making a start on this phase of the program he asked Mr. Henderson if he had any question on which he would like to get a group opinion.

Mr. Henderson:

I have been thinking that for our purposes today a general type of resolution might be better than several covering specific subjects. Any number of questions that have been raised in the course of this meeting could involve a specific resolution. It is my feeling that regardless of how closely we enumerate them we might still leave out some of importance. I am particularly wondering if this job should not be done with more thought than any one of us can give it here now. The recommendations of a committee as a follow-up of a general resolution might be a good idea.

Chairman Volk:

Mr. Brackeen (just came in), we are discussing the advisability of taking up several of the points under discussion in the form of a resolution of the group. Mr. Henderson suggests the advisability of getting together a smaller group comprised of those men who are specifically concerned with the survey and who are competent to exercise such judgment and make such decisions. If there are any points in particular you would like to bring up for re-discussion the meeting is now open for that purpose.

Mr. Long:

I would like to make a comment; or rather, elaborate a little on the comment I made this morning. These soil survey reports and maps are of value only to the extent that they are of use to somebody. My experience in Florida has been that there are some very decided currents of air that throw the ordinary meteorological records and agronomic data out of balance. Mr. Buckley, on the Moore Plantation near here has had a lot of experience and he says that these currents do not always follow the contours as shown on the geodetic survey maps. In other words, those rivers of cold are influenced by currents away above our terrain. We can find certain areas which, from the contour maps, look as if they might have splendid air drainage. On the contrary, however, you will find that they do not have. That, of course, goes entirely beyond the scope of soil science. However, if you could hook up with the meteorological fellows in some way and get a little help in finding those air currents, and if you could show them on the soil map the resulting map certainly would be more valuable.

Dr. Allison:

We have discussed that general problem in the past with Mr. Glenn Fuller of the Soil Conservation Service and the possibility of showing direction of slope on the soil map. This, of course, is the thing of concern there. Impoundment of cold air is one thing and free flow is another.

Mr. Long:

These ground currents of air are affected by other currents of air above. The local people can give you the most information about that. As you go thru the county to make a soil survey, inquire of the "Crackers". They will come pretty close to plotting those upper rivers of flow for you that you wouldn't think exist.

Dr. Allison:

From the use you have made of soil maps in the past would the slope direction be of any help?

Mr. Long:

It certainly would. After I have taken everything else into consideration, I find sometimes it is extremely helpful to find out from the old farmers if it is "early" land or "late" land. It sometimes helps a great deal and doesn't cost anything to get that information.

Chairman Volk:

Are there any other comments on this relation of the topographic survey to soil survey?

Dr. Davis:

I would like to put in a plea for more topographic surveys in Florida. The United States Geological Survey has always done the field and cartographic work

in the preparation of such maps. The Soil Science Society might write a few letters so that they would know somebody is interested.

CHAIRMAN VOLK:

Dr. Allison, do you have any suggestions as to further procedure?

DR. ALLISON:

It seems the discussion has come more or less to the point we were talking about this morning. Professor Collins suggested that before we disband tomorrow or go to sleep tonight we should bring our thoughts and recommendations together and at least point them up in a resolution and at the same time decide to whom the resolution should go. I feel that if such a resolution is carefully thought out and properly distributed, and the distribution of it made a part of it, i.e., as a statement on the face of it, it could be expected to have some good results. In such a resolution I doubt if we should air all of our grievances and differences, but at the same time we should not make it so general as to have the effect of essentially saying nothing. What I think we should have now, Mr. Chairman, is a discussion of (1) how broad the resolution should be and (2) its content; and (3) to whom it should be sent. I particularly feel that a documentation of our thinking along that line shouldn't be interpreted as an effort to irritate somebody, but rather to give them our thoughts on certain matters the same as if you should write a letter to your Congressman. I believe in that case, if the Congressman is a public spirited man of the right type he would appreciate it, especially if it represents the sentiments of a public group such as we are. These would be my first suggestions insofar as giving the meeting some ultimate purpose other than the fine discussions we have had today.

MR. BRACKEEN:

To whom should the resolution be sent?

DR. ALLISON:

Frankly, the soil survey procedure and all the intimate details with which it is involved is a little out of my field. That is why I have so greatly enjoyed meeting with you today. As I sense it our resolution should be a clear statement of whatever we decide upon that is giving us the most trouble—or a series of these things! Rather than go into too much detail I think only the general and most important problems should be brought into the picture. As I recall we have mostly discussed general difficulties of the soil survey throughout the day.

I feel we are particularly justified right now in raising this point because we have arrived at the eve of another era of planning—post-war planning if you please. If there is any way in which we can improve the usefulness of or point out the real need for the soil survey planning I think we ought to do it. We here in Florida are particularly interested since the 1951 Legislature gave us a brand new Soil Survey Law, largely through the very great and good efforts of Senator Ernest R. Graham of Miami, Chairman of our Soil Survey Committee and his ever-alert and hard-working assistant, Mr. Dewey B. Hooten, Executive Secretary of the Florida State Planning Board who scarcely ever let the "Ball" touch the ground. So you see we are quite the neophyte among you at least insofar as this new program is concerned.

MR. STOKES:

Unfortunately, I missed the discussion this morning so I am not in position to say much about it. It looks to me like there are some differences existing in the Soil Survey and there is a need to get together and iron out these differences for the good of all concerned. Certainly it would seem to be in order for us to pass some resolution to that end if it could possibly be of assistance in this connection.

DR. JAMISON:

I haven't any specific suggestions to make. I was very much interested in the earlier discussion of what the surface soil is and the subsoil. Coming here from the north, I am just beginning to get a little bit oriented to this notion. In fact, it seems a bit ridiculous to allow "surface soil" to take care of everything down to clay when it may be eight or ten feet below. To me the surface soil is that which is turned over with the plow, and the subsoil is what is underneath it. Maybe I am wrong and I have been brought up on the wrong definitions. It seems to me calling it surface soil way down to clay is trying to get away from the errors that have arisen

from the definition of soil classes. Something has to be done about it. I can't make any specific recommendations but it seems there should be something done to straighten this thing out. I don't think it is at all clear. Certainly we should try not to mix up the practical field with the scientific. That is my view on the matter.

DR. ALLISON:

That is a good practical addition to our discussion of this general problem in the profile. Going back to the question raised by Mr. Brackeen as to whom the resolution should be sent, if we are going to make a point of the need for coordination in methods of surveying in that resolution we should certainly send a copy of it to the Soil Conservation Service and to the Bureau of Plant Industry and probably arrange the subject matter accordingly. I should also like to see it sent to the Office of Experiment Stations. If there is any systematic contact that State Experiment Stations have with the Department of Agriculture it is through the Office of Experiment Stations; therefore that office should be kept informed on such an exchange of thought as this which we have with the Bureaus. Further, in order to let our colleagues in other states know what we are thinking about, and for the benefit of their advice, I think we should at least send such a documentation of our ideas to our workers in the Southeastern States. Whether to send it further than that would be a decision for the whole group. However, I further feel that it should go to the Joint Committee on Soil Survey of the Land Grant Colleges and the Department of Agriculture which is made up of six men (three state and three federal) and of which Dr. Richard Bradfield of Cornell is Chairman. This is the type of information that such committees like to have, because in this case there are only three men from each of these large organizations trying to sense the needs and desires of the program of the whole country. If anybody else has any suggestions as to the content of the resolution, or to whom it should be sent I am sure the Chairman would be glad to have them.

MR. STOKES:

Compare the regular soil survey bulletins, maps included, that we are accustomed to getting, with the survey work that the Soil Conservation Service is doing in connection with the Soil Conservation Districts, along with their land use capability maps, etc., and you find there is a connection between all of that work. However, I am just a little bit afraid that maybe each group of soils men are looking at the whole field thru too narrow a hole. All of us want to be of some assistance and use to the people we serve. If this work is going to be of use, as I see it, we have got to give them something they can understand and use. Now then, if either group or both groups are only giving them something, but not giving them enough, or not giving it to them in a way that they can use it, shouldn't there be some way to get the work together? Do you have that in mind, or do I see the wrong picture entirely?

DR. ALLISON:

I think, Prof. Stokes, that you have sensed the situation very well. Indeed that which you have stated so clearly seems to be one of our principal objectives: i.e., the development of a straight line soil survey program that is comprehensive enough and broad enough to serve any purpose, practical or technical, including supplemental reports and association maps for use in land management programs, etc.

MR. STOKES:

The soil survey reports, as such, as I have seen them and studied them, do not always bring out clearly the similarity of related soils. Maybe there is an attempt to bring that out in the land use capability maps of the Soil Conservation Service. There should be some way to give a little more useful information to people than that which is usually found in a soil survey report.

DR. ALLISON:

Would we sense your opinion correctly then in saying that we might make a complete soil survey report with a single approach to soil surveying methods?

MR. STOKES:

It would seem so. To do that kind of thing maybe we need more information with respect to some soils than we now have. That will only come to us with progress in soil and crop work.

DR. ALLISON:

As I think Mr. Henderson emphasized this morning, the soil map, as such, is not intended to give the final picture but should be the basis for orienting soil and crop work of all kinds.

MR. STOKES:

In the Soil Conservation Service, as I understand it, there is an attempt not only to get soils classified but an effort to tell the grower or rancher just what he can expect from his several soils. Well, that may be a guess or it may not. In any event it should be the best thing we know at the present time.

DR. ALLISON:

Any definite information we can give should be better than an outright guess. Additional information may be and will be gained from time to time, including that of a very practical nature that can be gleaned from farmers by discussing their problems, and ours, with them as Mr. Long has suggested. Most of those good people out on the land may no know *why* they know but they do have some good sound answers to many of the everyday problems with which we are confronted in crop adaptability and land use.

MR. BRACKEEN:

I have had the feeling for some time that there is too much redundency in our soil survey report. We should be more specific and leave out as many of the minor details as possible. We should bring out more clearly the use to which a given soil should be put. These are some of the suggestions I have made to the Bureau in Washington. We don't have enough data to bring out a lot of information but a cooperative effort is being made between the Soil Survey and the Agricultural Economics Department at Auburn to see what can be obtained from the farmers themselves and we get some very interesting information. We took a base map of a particular county and obtained yield data from three hundred farmers scattered all over the area; then we took our soil map and superimposed it upon the other. In this way we are getting some very good information to use in these various soil reports. I think that the AAA records also will be useful in the development of such data.

DR. COLLINS:

I think that Mr. Stokes and Mr. Brackeen have hit upon a very important phase of this work. We must all remember that soil survey work was started for the purpose of finding out what the soils are and how and why they are different. Unfortunately they seem to have stopped right there. Instead of going on and determining how various soils should be used and making practical applications of the information obtained they devoted practically all the effort to the scientific study of soil profiles and soil analyses. The Soil Conservation Service came along and is trying to find what the best use and management of the soils are under a program of erosion control. I think they are making good progress toward pulling information on soil conservation together. In the past, soils people placed too much emphasis on scientific data. We are just now getting around to the collection of practical information. We had thirty-two experimental fields located on different types of soil and got a pretty good idea of what could be done on those various soils. The data was never published because of reorganization of the College of Agriculture at about the time the data began to show up and we at the college do not have any facilities for research work at the present time. It is all in the hands of the Experiment Station and that organization does not have any connection with the soil survey work.

I feel that any resolution that is passed ought to suggest that more effort be made to show the relationship between soil characteristics and practical soil management problems.

MR. O'KELLEY:

I am no soils man. I came here to listen and to try to learn something. I have been interested in these discussions and particularly the discussion of the soil survey with relation to its practical application. That is a matter of commercial worth that I am interested in. I have had occasion to study a good deal on these soil surveys not only in Florida but in other counties and states that we are interested in, and

I am sorry to say that I have never found them of very much practical benefit. I have been wondering today really what is the idea of a soil survey. I used to think that it was to develop information and get it in such published form that the man who owned and operated a farm in the area could determine something from that survey, possibly as to what his soil lacks and what he could do on his farm. As I say, however, I have searched in vain in many instances for some aid from soil survey reports in various counties on certain questions in regard to adaptability of land, to very little avail. I have been sitting here today in all this discussion wondering what really is the idea of the soil survey, and of what use it is after we get it.

I repeat that I am not a soils man and know nothing about the technique of soil surveys. However, the question that has constantly been running thru my mind and which has been brought out several times today is if something cannot be done to add to the practical value of these surveys, and if they are not going to be of any practical use to the man who owns and operates the land, whether they are worthwhile after all.

I might say that I have been quite favorably impressed with the type of soil survey the Soil Conservation Service is making of individual farms and the practical adaptation that these surveys have to the operation of that farm. It seems to me that organization is really getting down to the bottom of things and developing its work on a basis where the soil survey is really going to be of great benefit to the man who should benefit from such work. I may be missing the point altogether but it does seem to me if something could be done to make all the soil surveys that are being made of greater use to the land owners and farmers—the people who should receive the benefit from work of this kind—it would be an excellent thing. However, I am not in a position to make any suggestions as to how it could or should be done.

DR. ALLISON:

Thank you, Mr. O'Kelley. Your statement is very much in line with the discussion of the day because we also really want to know how to do it and I think some of us are just as anxious as you are to really put the soil survey to work.

MR. HELMS:

It seems to me that maybe there is a little misunderstanding of the different surveys made by different agencies. The surveys are made somewhat similar regardless of who makes them and furnish basic information which can be locally interpreted and applied and made very useful. The land capability classification that is used in soil conservation surveys is just an attempt to make practical use of systematic soil surveys. The capability maps can be superimposed on soil surveys whether they are made by the Soil Conservation Service or by the Bureau of Plant Industry, Soils and Agricultural Engineering. Slope and erosion come in very forcibly from our standpoint because we are concerned not only with the present productivity of the land, but with the possibility of continuous production. Insofar as the use of the surveys themselves are concerned, or the lack of their being used, I wonder if that is so much the fault of the survey as of agencies or indivduals involved in failing to work out a system to make practical use of them. I think the surveys furnish basic information that we can make practical use of. A North Carolina county and a Florida county might share similar soils but because of climatic differences they certainly would not have the same crop adaptions and adapted land uses. Any survey must be interpreted in the light of local conditions. We don't attempt to make a capability table that would apply all over the region, but make one for each district and make local application of it. That capability table takes into account the productivity of the land in its present condition and the possibility of continuous productivity, and, of course, the necessary practices to keep it continuously productive. I believe we need a workable scheme for making the surveys useful and should get what information is necessary to do that.

DR. THORNTON:

I support Mr. Helms in the idea of getting other agencies to use the maps that have been made. I don't know how to go about it but I think that in our resolution we ought to recommend the preparation of a soil survey for other people such as teachers of vocational agriculture and the county agents. I did a good bit of work in the field at one time which called for cooperation of the county agents, many of whom didn't even have copies of the soil map or soil survey of their own county, when I knew they had been surveyed. The county agents did not use the reports or the maps.

Dr. Allison:

Do you not think that considerable effort should be given to make a report that would be attractive to them?

Dr. Thornton:

I certainly do.

Chairman Volk:

In that connection we probably should urge that people in our own agencies become familiar with the soil types with which they are working and discuss results of their work on the soil type basis.

Dr. Allison:

Mr. Boyd, I know you are conserving your strength for tomorrow, but have you any suggestions along the lines of the present discussion?

Mr. Boyd:

I don't know that I can add very much to the Soil Survey discussion and methods of streng hening it. As you know, and most of these fellows know, I am in the fertilizer business and I do make some use of soil survey reports and study the maps in an effort to work out the reason why folks use certain fertilizers on certain soils. I notice Mr. Henderson said this morning we have one hundred and two series in Florida. Maybe that is why we have so many fertilizer grades in Florida. Perhaps we are trying to have a grade for each series. It seems that the modern thinking on that is to go the other way. I have read some of Mr. Stokes' bulletins. In one of them it was reported that they tried a certain fertilizer on several soil series and obtained the same response in all instances except one now and then. While I agree that the soil survey report should be in considerable detail, still I am one of those fellows who think that we should prepare a simple map that we can take out and talk to our farmers and students with and about. After all, we do use the same fertilizer on each and all of the soils of a particular group. In making recommendations or suggestions in the survey reports it seems to me that you should use Mr. Stokes' data to show fertilizer responses until we have found that data to be out of date. After all, if you grow corn on all of the soils on a farm you use only one fertilizer, but if you wanted to really confused the farmer you could tell him every soil had to have a different fertilizer. Farmers buy one fertilizer for all their soils; the Red Bay and Ruston and Norfolk. If we could simplify the soil map accordingly I think it would be a real contribution.

Dr. Allison:

Thank you, Mr. Boyd. You not only get down to earth in your discussion, you burrow around in it!

Dr. Collins:

Mr. Boyd has brought out exactly what I mentioned this morning; what we have to do if we expect to "stay in business". I think the detailed soil survey information is of value to the soils man and to the farmer, but the farmer is not going to change his fertilizer or other practices when he passes from Orangeburg to Ruston, etc. If they are adapted to the same crop he is going to use them that way. That is the interpretation he is going to put on it. Thus we ought to make a simplified map for practical people like Mr. Boyd and Mr. O'Kelley from a detailed soil survey that has been made by the soil survey workers.

Mr. Brackeen:

I would like to make a statement, not to contradict but to give a little different view on the matter of fertilizer. It so happens that most of those soils occur on contours; Red Bay is at the upper level and on the next contour are Norfolk and Ruston sandy loams, and, down a little further, still others. That is generally the order of occurrence. I am not trying to contradict Mr. Boyd but we generally find these soils on different contours and we cultivate them in that manner.

Dr. Jamison:

I think it is true that we do tend to criticize the soil survey too much. Perhaps the fault doesn't lie entirely with the soil surveyor, but he has to have the help of

other technicians to bring the work to a point where it can be used by the farmer. What happened in one of our sta es in the north was this: in the soil survey report the Lordstown soils were placed in one of the lower classes and the Federal government was buying these soils up and paying people to turn them back to forests. Attempts were being made to reforest them until some smart fellow learned that these soils would grow po'atoes. Wherever they were close to good highways or where he could make easy access to market he began buying up large areas of those soils for a song. In the next few years he was making money hand over fist with the result that those soils have jumped from a low to a rather high class. The soil characteristics did not change, only a good use for them was found. If the farmers had realized that they could grow potatoes they could have stayed with their farms.

DR. ALLISON:

If we characterize any soil as worthless at any time we should say "according to our present information." What about the slope of these soils where they are growing potatoes?

DR. JAMISON:

It was table-top land. What I want to bring out was that the soil survey up there was getting the blame for the mistake. The surveyor had done a very good job in describing the characteristics of the soil but did not know its capabilities or adaptations which, of course, was the job of the Experiment Station to determine.

DR. ALLISON:

Dr. Westgate, have you anything to add?

DR. WESTGATE:

I am sort of new here and I am learning a lot.

DR. ALLISON:

How about you, Dr. Lott?

DR. LOTT:

The chief concern that we have down in the Everglades is why some soils are good and some are not. The biggest problem has been to determine the kind of soils we can grow sugar cane on and whether we can grow it on soils we haven't tried yet. We are getting back to the thing most of these men have discussed here today. You have to go back to the farmer for past yield records to de ermine what will be your best use of the land. It is up to the agronomist and the experimental men in general to find out and to correlate the soil survey with actual productivity.

DR. ALLISON:

Mr. Chairman, since our time is running out and the business meeting is about due I would like to suggest that we close this remarkably interesting and profitable discussion where Dr. Lott left us, right in the middle of the richest soil in the world —the Florida Everglades. May I also suggest that the additional members of the Resolutions Committee be appointed at your good convenience. I am sure that your selections will meet with the full approval of Mr. W. F. Therkildson, Chairman of the Resolutions Committee, who, unfortunately could not be with us today.

Before closing the meeting I am wondering if consideration should not be given to the preparation of a resolu ion in behalf of the resumption and continua ion of the topographic survey in the state that was discussed at different times and at some length yesterday when Dr. Davis and Mr. Long were present.

CHAIRMAN VOLK:

Is there any discussion concerning the need for the resumption of the topographic survey? Evidently, some support is needed to get the work reinstated and reorganized. It is unfortunate that Dr. Davis is not here today as such work certainly should be closely coordinated with that of the Geological Survey.

DR. ALLISON:

Certainly such a need is what Dr. Davis indicated yesterday, as well as Mr. Long.

Mr. Henderson:

There are a number of instances here in the state where I think a topographic survey would be helpful in connection with land use practices and reference is particularly to the location of tung and citrus groves, etc., and in some instances the location of vegetable areas. The suitability of the land is determined by air currents which in part appear to be controlled by the contour of the land. It seems to me that such a survey would be quite helpful to us as well as to a lot of other people. If in order, I move that such a resolution be drawn.

Chairman Volk:

Dr. Drosdoff, what is your reaction?

Dr. Drosdoff:

As far as determining the suitability of soil types in the various areas for possible future expansion in tung, I think it would be very valuable and very important to have these topographic surveys. We always try to avoid the low basin areas. Then, too, of course, in establishing tung orchards where slopes are steep there is the problem of terracing.

Chairman Volk:

Anyone else who would like individually to go on record with a statement in support of this resolution? (None.) Is there a second to the motion? (Motion seconded and carried.) The Secretary will please advise the Resolutions Committee and ask that such a resolution be drawn and passed to the interested parties prior to publication in the Proceedings of this meeting.

Chairman Volk closed the meeting at 5:00 P.M. and immediately called a general business meeting of the Society which will be found reported on page 66 of this Proceedings.

# TRI-STATE DISCUSSION OF LAND USE PROBLEMS OF MUTUAL INTEREST TO ALABAMA, GEORGIA AND FLORIDA

December 10, 1943

Vice President G. M. Volk, Chairman

The meeting was opened at 10:00 A.M. by Chairman Volk by first noting with regret that due to travel and other difficulties the following men could not be present: Dr. N. J. Volk, Alabama; Dr. Wm. F. Watkins, Washington, D. C.; Dr. H. B. Mann, Atlanta; and Dr. H. P. Cooper, S. C. At the request of the Chairman the Secretary read a letter from Dr. Watkins emphasizing his regret at being unable to attend the discussion and his interest in the subject to be discussed. He is Chief, Fertilizer Requirements Section, Chemicals and Fertilizer Branch, War Food Administration, Office of Materials and Facilities, Washington, D. C.

The chairman then outlined the principal objectives of the present discussion as a review of land use problems common to Alabama, Georgia and Florida, especially from the standpoint of fertilizer ratio and grade requirements as well as rates of application to various crops on various soil types and groups of types common to the three States—Alabama, Georgia and Florida, as outlined on a general problem area map of the Southeast that was displayed for the purpose. He also called attention to the fact that the record would be taken by Mrs. Marshall in the same manner as during the Soil Survey conference yesterday.

Before starting the discussion the Chairman also outlined in general terms the phases into which the subject matter of the discussion might well be divided and asked Mr. Henderson to open the discussion on the first phase—Soil Types and Crops Involved.[1]

Mr. Henderson:

What I will have to say will be very brief. For some time various organizations throughout the country have been interested in developing a sort of problem area map. In its original form it was developed by Dr. Allison and Dr. Scarseth as co-chairmen of an extensive symposium on this subject for the entire coun ry which involved 11 regional maps generally similar to the one you see here for the Southeast. This was on the occasion of the organization meeting of the Soil Science Society of America held in Washington, D. C., November, 1936, just three years before the Soil Science Society of Florida was born. Of course this type of problem area map is greatly generalized but not much more so than the information that we are going to try to apply to the individual areas. This map has been revised many times, the latest revision being made this year. We also have a General Soil Associations map of the Southeast, prepared this year.

The northern part of Florida along the Alabama-Georgia line might be divided into about four or five problem areas. The soils and crops combination along this line is about the same as far east as the Suwannee River. The principal soils involved are the loamy sands and sandy loams of the following series: Norfolk, Ruston, Orangeburg, Tifton, Marlboro, Faceville, Magnolia, Red Bay, Greenville and Blakely. The leading crops are: corn, cotton, peanuts, shade tobacco, pecans and tung.

[1] The full name and position of each speaker in the conference is listed with those of the Soil Survey conference on page 21.

Coming on over to the east (on the map) we have the so-called ridge section which extends up to the Georgia line, and a little beyond in some cases, in which peanuts, corn and bright tobacco are the dominant crops. There is also a vegetable area in this section of Florida in which potatoes and cabbage seem to be most important. These soils are quite sandy mainly Norfolk and Blanton sands.

In the flatwoods, along the eastern side of the State, vegetable crops are important and Bladen is the main soil series used for their production. Perhaps Dr. Collins and Mr. Brackeen could add something that I have not thought of.

DR. COLLINS:

I don't believe I have any comment to make except that the flatwoods area is not as prominent in agricultural activities in Georgia as in Florida. We don't make general fertilizer recommendations for that area for the simple reason that we don't have a great deal of information on it. It is mostly grazing land for wild hogs and cattle, with a little general agriculture. I might say that the sandy ridge goes up a little further into Georgia probably than you think it does.

MR. BRACKEEN:

I don't know that I understand exactly what is desired. I think I know the soils of the area and I know the principal crops. However, the problem area lines don't quite fit what I am thinking about.

MR. VOLK:

I think this would be a good time for Dr. Allison to give us a little more to shoot at. Unfortunately Mr. Warner is not with us, but I think we need a little further discussion on this general soils approach before we go into the crops discussion.

DR. ALLISON:

As I understand the areas pointed out, there isn't any effort to make them too distinct. I had hoped that Mr. Henderson would give the physiographic names of the various areas. The whole thing is just a basis for simple division of soils into groups so we can discuss our crops from that standpoint a little more easily. Would you want to add anything to that, Mr. Henderson?

MR. HENDERSON:

I will read the legend on the Generalized Problem Area Map. No. 18, the Middle Coastal Plain, embraces all of the northern part of Florida east to the Suwannee River, extends well up into Georgia and considerably into Alabama. Along the State line that area embraces two or three distinct groups of soil.

Area No. 13 on the map is shown as Norfolk, Ruston and Tifton. These soils are dominant in that section. Along with those we find some Greenville, Magnolia, Orangeburg and Blakely but only two small areas of these are shown along the State line.

Area No. 20 is the Gulf coastal flatwoods of this section of Florida and are mainly non-agricultural. I believe there is more agriculture in this area in Alabama than in Florida. Mr. Brackeen could probably tell us a great deal about the specific fertilizer recommendations for Irish potatoes in this section of Alabama. I understand most of the potato farmers in the extreme western part of Florida rely on the Fairhope Station recommendations. Most of the potatoes in Florida are grown in Dade County and in the Hastings area, which are quite widely separated as far as soils and climatic conditions are concerned.

Area No. 21, the rolling sandy lands, as Mr. Collins has said, probably extend into Georgia more than I thought. For the most part in North Florida a general type of farming with corn, peanuts, bright tobacco and livestock is most common on this type of land.

Area No. 19, the Atlantic flatwoods, is divided into three sections more or less arbitrarily: 19-B covers areas we will probably discuss today. In the Jacksonville area we have pastures in connection with dairying and poultry production; and elsewhere we have mainly potatoes and cabbage on this group. The dominant soils are Leon, Plummer and Bladen.

That just about covers the areas that are common to the three states. As I understand the intent of the discussion today, an attempt will be made to analyze present fertilizer recommendations to see if they can be made any more specific or if they should be made more general. I have felt at times, when looking around

for data, that we haven't tied our research data closely enough to soil conditions to know just where we are. It seems to me that one of the things that should come out of the discussion today is more specific recommendations for specific crops on these general soil groups.

CHAIRMAN VOLK:

We might begin with a discussion on the pasture situation. We have Mr. Stokes, Mr. Blaser and Dr. Ensminger with us. I wonder if Mr. Stokes would give us something on the fertilizer practices with pasture along the northern border of the state and, if familiar with what is being done across the line, draw some comparisons there so we will have some idea of the variations which exist.

MR. STOKES:

I will just touch on it in a general way. Most of our pasture fertilizer work has been done on the flatwoods soils rather than in the Northwestern part of the state on the heavier well drained soils. However, for a mixed pasture of grass and legumes we are generally recommending the use of lime, phosphate and potash. For straight grass pastures we are not too sure, as yet, that we can use a complete fertilizer which is going to be profitable. Suppose I leave it there.

MR. BLASER:

As Mr. Stokes brought out, the fertilizer program for legumes is lime, phosphate and potash. To be specific, we recommend an 0-14-10 at the rate of 600 pounds per acre. I am not sure but that on many of these soils the potash will have to be increased, particularly after the first year. We feel that for Florida the legume program is of primary importance and should be worked out very carefully. In general, returns for beef cattle per acre are very low when compared with truck and citrus crops. Therefore, the fertilization cost must be low. That brings up a question which Mr. Stokes brought out about fertilizing grasses.

We get excellent responses in grasses from nitrogenous fertilizer. Some of the grasses, particularly Dallis, must have a good supply of nitrogen fertilizer to grow satisfactorily because these soils are generally low in nitrogen. We are doubtful at the present time, however, whether we can afford nitrogenous fertilizer on pastures for beef cattle. For poultry and dairy that is, of course, entirely different. In general, the dairymen could easily use two to three times the quantity of nitrogen that they are using, and I think they should in view of the high feed costs and the shortage of concentrates. It looks to us like the dairymen, as a group, should grow more of the winter grazing crops—oats and rye and maybe Italian rye grass—and practice nitrogenous fertilization.

We have used 72 pounds of nitrogen per acre and, of course, gotten very nice responses to that amount. With half that amount we still get good responses. It is questionable, however, if even that amount is profitable to use for beef cattle. Thus, with carpet grass unfertilized the annual gains over a two-year period were 50 pounds per acre. On that fertilized with one ton of lime to start with, and 500 pounds of 6-6-6 fertilizer the average annual gain for three years was approximately 175 pounds per acre. On carpet grass and lespedeza fertilized with one ton of lime and 400 pounds of 0-14-10, the gains were 200 pounds greater. The legume increases the gain and the cost of the fertilizer is less. The outstanding response is with clover and carpet grass, fertilized initially with one ton of lime and 600 pounds of 0-16-8. The first year the gain was 330 pounds. That fall it was fertilized with 400 pounds of an 0-10-10 and the gain was 560 pounds. It was then fertilized again the following year with 400 pounds of 0-10-10 and the gain was slightly over 600 pounds that year.

It is doubtful if we can do as much with commercial nitrogen as with legumes. As yet I feel that nitrogenous fertilizers are rather high in cost to recommend to beef cattlemen. I think Mr. Stokes feels the same way. With the high cost of this element the returns are just not high enough to pay for it.

MR. STOKES:

In these extensive range areas when there has been an attempt at pasture improvement on Leon and Plummer soils, they now use regular phosphate on the AAA pasture program for beef cattle. I don't say that is the program that should be followed on and on but it is the beginning operation there. There hasn't necessarily been a great deal of difference noted between the phosphated and unphosphated

areas, but cattlemen are convinced that the cattle have noticed the difference where the phosphate has been applied. Some of our plant samples from those areas indicate a good increase in phosphate content of the forage as a result of fertilization.

Some of those areas, understand, are down the state where perhaps the climatic conditions are not as well suited to growing legumes in with the grass as in the northeastern part of the state, or perhaps we haven't learned how to manipulate the planting operation to get as satisfactory growth of legumes in that section as we have further up the state.

MR. BLASER:

I am glad you mentioned that. Even tho I said what I did about nitrogen fertilizer, I didn't mean that we don't believe in nitrogen. For instance here is a cattleman who has five thousand acres of land. There was a time when we were so enthusiastic that we would have recommended he break most of that land for planting permanent pasture. However, we have now reached the stage that we feel that only one-fourth to one-half of any particular area that a cattleman may have is suitable for developing permanent pastures; and for that one-fourth or one-half or whatever portion is developed into permanent pasture we would strongly recommend that he manage that just right and on the remainder of the area get what grazing he can from the native grasses.

The cattlemen as a group have been interested in cattle and not timber, and we strongly feel that the soil should be very carefully selected for the pasture crop to be planted. We have talked that over with the forestry people and they have agreed that it would be best to use the better soil for pastures though realizing at the same time that the better land would grow better trees than poor land; but also that the poor land will grow trees without any treatment. We feel that before the cattle program can go so very far we must increase the value of our feed. This may be accomplished in two ways; first by introduction of species of improved pasture plants, and, secondly, by fertilization. As Mr. Stokes mentioned, our figures indicate that the phosphorus content in the forage from pastures in the southern part of the state has been increased 70 percent by applying phosphate. Any source of phosphate we have used has increased the phosphorus content. The calcium content was also increased 30 percent. The potash requirements of the animals are very great no doubt and reports show that, also, will have to be gone into.

DR. COLLINS:

Do you make any distinction between your problem areas or your soil groups in your recommendations for pasture fertilization?

MR. BLASER:

Yes. For example, in south Florida we have not yet been really successful with legumes even though some of the soil types there would be similar to those further north. The climatic factor doubtless enters in. We feel that the Leon soil down there is more acid and lower in organic matter than up here.

DR. COLLINS:

Your fertilizer practice would differ with the type of plant or combination of plants grown?

MR. BLASER:

Yes. We definitely feel that soil treatment will depend on what you are trying to grow.

DR. COLLINS:

You don't make any distinction on the basis of soils; you vary your fertilizer to the crop grown?

MR. BLASER:

That is the case.

CHAIRMAN VOLK:

What is the basis for the use of rock phosphate on the north Florida soils? I believe the Alabama experience has led to some doubt as to the efficiency of

insoluble phosphate of that type. I wonder what conclusions we might draw on that in Florida.

DR. ENSMINGER:

Over in the Quincy area I believe the phosphorus content of the forage was about as high on the rock phosphate plots as on the superphosphate plots.

CHAIRMAN VOLK:

What soil type was involved?

MR. HENDERSON:

Dunbar fine sandy loam.

CHAIRMAN VOLK:

Do you have any information on the difference in results between rock and superphosphate?

MR. BLASER:

Comparing the results where the rock phosphate was used at the rate of 1½ tons per acre, and superphosphate was used at the rate of 600 pounds; the growth was quite satisfactory with both kinds—there wasn't a great deal of difference. Mr. Warner did feel at one time that rock phosphate might have a place in that area. However, I am rather doubtful for one reason, namely, the economic factor. As you get further away from the mines rock phosphate costs more money and that will tend to be a factor.

DR. ENSMINGER:

It might be observed that the red clover responded to rock phosphate better than did White Dutch. Rock phosphate on the red clover showed up as good as any of the other phosphates. Louisiana red responded equally well to both types but with White Dutch rock phosphate wasn't quite as good as super.

MR. BLASER:

The Trifolium clovers, which include red, white, crimson and hop require more phosphate than do the Medicago and Melilotus clovers.

CHAIRMAN VOLK:

How does that information fit into what you might have in Alabama, Mr. Brackeen. Are you familiar with it?

MR. BRACKEEN:

No.

CHAIRMAN VOLK:

Mr. Boyd, do you have any information on this relationship between super and rock?

MR. BOYD:

No, except that both seem to be quite satisfactory.

DR. COLLINS:

We have gotten some good results with the rock phosphate on pasture. We pay ten to twelve dollars per ton for rock phosphate in the Piedmont section but haven't found it economical there.

MR. BLASER:

I think another problem that comes in with the using of those two phosphates is sulphur deficiency. I would like to follow that thru. It may be a factor.

CHAIRMAN VOLK:

The time is moving right along and we had probably better pass on to a consideration of other questions. Mr. Stokes will you please open the discussion of fertilization along the border line of the three states.

MR. STOKES:

As far as I can tell there is not a great difference in fertilizer practices in this general area. We all use pretty much the same grades of fertilizers. For instance tobacco in the Georgia-Florida section is fertilized about the same.

For other crops on all soils except the thin sands we are suggesting two or three hundred pounds of complete fertilizer per acre. Just what grade or formula it should be we cannot definitely say, as yet. We suggest 3-8-5 or 4-8-4. Our experimental work is beginning to indicate that we might profitably step up the treatment especially the potash application. This indicates we are not using quite as much potash with peanuts as we would high priced feeds. At the present time we are suggesting a small amount of complete fertilizer. The increase in yield has been on an average of about 15 percent from the use of about 300 pounds of fertilizer such as 2-10-4. I am not saying that is the grade that should be used, but that is what is indicated. And in addition, we find that sulphur dust applications will step the plant yield up another 15 percent, as a rule.

We are beginning, thru the mobile units now operating, to get more detailed information on fertilizer responses to pasture crops in the northwest section of the state. As we look at the results at the present time, take the farm lands in counties like Leon and Jefferson which have been farmed a long time and which were old cotton farms, there never has been a great deal of fertilizer used on these farms even when they were growing cotton, and not too much attention paid to soil conservation either. We are now getting remarkable response from potash in the case of cotton and corn in Jefferson, Leon and Madison counties.

We also have some indication, particularly in the case of velvet beans, that, in addition to potash, we might need magnesium in that section.

In newer farm lands in Escambia, Santa Rosa and adjoining counties, it seems that the soil is heavier than in Leon, Madison and Jefferson. But I would say generally, with the exception of the extreme potash deficiency just referred to, that the responses to fertilizer are very similar.

As to use of lime in connection with those fertilizer treatments, we have some instances where the use of limestones has stepped up yields. In other cases it hasn't yet been found to have any influence. We need more work on the use of lime not only for growing specific crops but also in connection with the development of adequate crop rotations.

DR. COLLINS:

I agree with Mr. Stokes about increased potash requirements. I conducted a series of experiments this past year on the various returns of nitrogen, 40-60 80 pounds per acre on corn and cotton. I used 40 pounds of super phosphate and 40 pounds of potash, and increased the nitrogen up to 100 pounds. In general the indications were that 40 pounds of nitrogen was enough in most cases, unless the phosphate and potash were increased. That is on soils that are generally thought not to need a high application of phosphate.

For peanuts we have a recommendation that covers three conditions—0-14-10, 0-18-20 and 2-12-6. These recommendations are based on definite rotations where peanuts follow cotton, for instance, and that crop was highly fertilized in superphosphate.

CHAIRMAN VOLK:

How does that fit with South Alabama, Mr. Boyd?

MR. BOYD:

For peanuts in southern Alabama I believe 0-14-10 is recommended to a good many farmers who plant peanuts on very poor land. When this crop sells for the present price per ton complete fertilizers are commonly used. Thus it appears the three states are pretty well together on peanut fertilizer; phosphate alone, and phosphate and potash, or a complete fertilizer, depending on the condition of the land on which they are planted, and the rotation that is being used.

CHAIRMAN VOLK:

Perhaps we could now have a little discussion of fertilizer for truck crops. Dr. Jamison would you care to lead the way on this?

DR. JAMISON:

The truck crop acreage in north Florida in comparison to that of general farm crops is decidedly small. We haven't made any special effort to study fertilizers for truck crops in west Florida. As a result when truck crops are grown in west Florida the fertilizer practice is a continuation, as I see it, of the fertilizer practice used for field crops. I am thinking of sweet potatoes and watermelons as the two chief crops, although we do have other crops such as potatoes in the extreme western part of the state; and certain limited areas that grow cabbage. Here they do raise the nitrogen over the amount usually found in the low crop fertilizers. In other words, 3-8-5 has been mentioned here several times in connection with field crops. However, I think that will be found to be somewhat too low in nitrogen for these crops. There are a number of growers who are using 4-7-5.

The important thing about truck crop fertilizer is not so much the grade used as the tonnage. In other words, truck crop fertilization all thru the state is rather the opposite of what was mentioned in pasture work. Truck crops are a high return crop, so the grower uses the maximum amount of fertilizer, even though fertilizer is an important item in the cost of production. For instance, in talking about phosphate, suppose you can show a truck grower how he can decrease his phosphate application to about one-half the usual application; he will ask, "what does that figure out in terms of dollars?" You may figure eight; or ten, or maybe fifteen dollars per acre. That doesn't mean a thing to him when he is growing a crop that may return $300.00 or more per acre. When we think of truck crop fertilizer the important thing is the balance. That is to say, we cannot afford to decrease any element unless we are actually increasing production; whereas on some of those other crops if we can show we can get the same production by decreasing, we have made a contribution. In the instance of truck crops, if you show that they can maintain production by decreasing one or the other of the materials they have been using, it just doesn't mean much to them. They will still continue to use the maximum amount of fertilizer. From that standpoint it may be a little harder to change recommendations for truck crops than for some of the other crops.

CHAIRMAN VOLK:

You have brought up a very important point, Dr. Jamison, at least in an incidental way. Reference is to the need to be on the lookout for toxicity from over-fertilization along with the consideration of economic fertilization.

DR. JAMISON:

If we can leave the north Florida section for a moment we might give a more specific example. Thus in the Sanford celery section they use up to 4 tons of fertilizer per acre. When you use some such tonnage as that year after year on the same land I think what you mentioned may happen. However, in the North Florida Section I don't believe we will run into that.

DR. WESTGATE:

I would like to ask whether you ran into any trouble from burning since the organic nitrogen largely has been replaced by synthetics?

DR. JAMISON:

We haven't dropped completely out of organics yet. We probably have, but it is not recorded. We have been doing some work on that very relationship but again, it doesn't apply particularly to west Florida. We do know by a study of methods of placing the fertilizer in the soil that we can use more synthetic and less organics and get away with it. We also have some information that shows that one of the benefits of the use of organics has been from that very thing—the prevention of injury to seedling plants Growers in the Hastings potato section, for instance, have learned to so place fertilizers that they won't come in contact with the plant. In this way the danger is removed.

CHAIRMAN VOLK:

Thank you Dr. Jamison. At this time I would like to see if we can get a summarization of ratios and grades started. I notice that Mr. Boyd had a list of the comparative grades in the three states, recommended grades that is, and I wonder if he would care to open the discussion on this point.

Mr. Boyd:

Thank you, Mr. Chairman. I would like to use the map. As you know, I am interested in the things you are talking about purely from the distribution of the fertilizer that the growers are going to use. The thing you seem to be talking about is what we are all interested in, namely, this yellow strip here on the map; in other words, what happens along the border between Florida and Georgia and Alabama. To bring it right down to brass tacks, I will illustrate. We have a fertilizer plant here at Dothan, Alabama, which is on the corner and above the line from Florida and just over the line out of Georgia. From that plant, of course, we distribute fertilizer into all three states. During the last couple of years you have made a lot of progress in reducing the number of fertilizer formulas sold in these three states. Florida has changed from 900 different grades to some 30. Alabama has had over 50 grades of fertilizer during the past ten years, but during the last two or three years they have gotten the list down to about five or six. Georgia had a large number of grades and they have reduced them to about a dozen.

As distributors of fertilizer we are very much interested in that, particularly at a time like this when labor is so short and it is hard to get fertilizer made and distributed. Naturally the less grades we have to make the more simple our problem becomes. Therefore, the more you reduce the number of grades the better we like it. We have a list in Georgia which is smaller than it used to be, and we like that; and for Florida, we like its small list very much. However, each state made up its list without conferring with the other states; so the list we have in Alabama doesn't look like the list from Georgia, etc. Thus, our company still has to make all the grades that Georgia, Florida and Alabama want. Therefore, while you helped yourself within the state, we still have a lot of grades to make. Mr. Henderson has discussed this map very nicely and has indicated that all these soils are not alike. However, for my purpose they are all the same and the crops you grow in this area are cotton, corn, peanuts, tobacco and a little truck.

Now it seems to me that it would be a real advantage if all of you could have the same fertilizer for peanuts just above the line in Alabama and just below the line in Florida, etc. As a matter of fact, however, Mr. Stokes says that the mixture he recommends for Florida is 2-10-4; in Georgia Dr. Collins says it ought to be 2-12-6, and in Alabama they don't officially recommend any complete grade for peanuts. However, Alabama does recommend 0-14-10, and Georgia recommends 0-14-10 and Florida recommends 0-14-10. We have *one* grade that is common to all three. But Georgia adds 0-14-7. Down in Florida they have an 0-14-5 which Mr. Stokes also recommends for peanuts. Thus up here at Dothan we have to make 0-14-5, 0-14-7, 0-14-10, 2-10-4 and 2-12-6 all for peanuts. I mean they are so designated: "These are peanut fertilizers"—all five grades. Within fifty miles of our plant we could be in all three states, and according to this map it is all the same group of soils—Middle Coastal Plain, or the general description you give for it. Now that is the thing I am interested in as a distributor of fertilizer grades in that area. I wish Mr. Stokes and Mr. Collins and Mr. Volk and their associates could get together somewhere, some time, and see if we cannot work out less than four or five mixtures for peanuts. This would be a great help. There really should be a 0-14-10—one without nitrogen. We recognize that as a desirable peanut mixture at the moment; and I agree with Georgia and Florida we should have a complete grade for peanuts because a lot of our farmers plant peanuts on land that would not grow peanuts big enough to cultivate if they didn't put a little nitrogen under them. And, of course, a lot of farmers use straight phosphate. In other words, we have two mixed grades, complete, that the farmers are now using; we have three no-nitrogen grades; and we have superphosphate.

I am not here to tell you what you should do; I am trying to discuss the problem. If some time in the future we could get our heads together and work out a more uniform set of grades for peanuts, or for this area, much would be accomplished toward simplifying this problem.

If we were to discuss cotton it would be the same story. The south Alabama fertilizer for cotton is, in the main, 4-10-5; in Georgia 3-7-6 and in Florida 3-8-5. In other words here is cotton growing right along the line. I know a few farmers who own land along the line and one has to buy 3-8-5 for his cotton while up in the other state the grade is different. Since this conference is held here to discuss mutual problems for the three states, and you have been discussing it from a soil survey standpoint and other angles, I am bringing in this other viewpoint which means that if the soils are generally the same and the crop is the same and the climatic con-

ditions along the state line must be about the same, then we could help a great deal if we would get together on uniformity of grades, not necessarily reduce them any further, as to number.

As a matter of fact I think you have done a swell job in getting them down to the few there are. However, as far as the fertilizer company is concerned, we still have a multiplicity of grades because the three states failed to discuss their grades. In a factory like ours that serves all three states, you can see how our problem is expanded rather than helped. We still have a large number of grades to make. Of course, on the map here you have shown another group of soil types for the peninsular part of Florida, which is mainly this pink color with a little ridge in between. Of course, when you publish a list of the Florida grades you include all the grades from Key West to Pensacola. When a farmer in Graceville, Florida, looks at this list and says, "I will go to Dothan and get some of that," of course that brings up the problem of how, somehow or other, we can make recommendations or designate that these grades are for use primarily in the peninsular part of Florida, and o her grades are for use primarily in West Florida. Certainly you could write it in there so that we could know what you think about it; that such and such a grade is not supposed to be a west Florida fertilizer.

We were trying to make 0-14-10 for everybody on peanuts. Well 0-14-5 is on the Florida list and I no:ice that they use worlds of that in the West Palm Beach area. It is for muck soil. A lot of that grade is used down there so we figured we would not make that in west Florida if we could help it. We had a good customer at Graceville and he found that 0-14-5 cost less than 0-14-10, so he wanted us to make that for his Graceville peanuts. We tried to out-talk him but he said "if you can't make it your competitor will"—so we decided to make it. We thought we would make about 50 tons. His argument was that his neighbors wanted a little. We made up 50 tons and sold 20; and we still have 30. Thus if you could only say 0-14-10 is the only no-nitrogen goods we recommend for peantus—we may have to make some of these others—it surely would help us.

Georgia finally decided that 3-9-9 was the flue-cured tobacco fertilizer. We have a few growers in Alabama and we decided we would make the same grade that Georgia uses, so we made a 3-9-9. But Mr. Stokes and his crowd wanted a 3-8-8 so we have got to make both of them—all for flue-cured tobacco.

Then, too, there is the case of shade tobacco. Georgia had a 4-2-10; Florida a 4-4-8. This year Georgia reviewed a lot of experimental work and now they have changed their grade to 4-10-8 and they changed it without saying a word to Florida about it. I merely want to leave this thought and hope with you, that we try to confer with each o'her before changing a grade of fertilizer. Then maybe we could get together in a way that would simplify our problem. I appreciate the opportunity of leaving this message with you.

CHAIRMAN VOLK:

It looks like we may have the answer to our 64-dollar question. We have with us Dr. J. J. Taylor, State Chemist, who needs no introduction. I am sure you would like to have him say a few words about fertilizer registrations in the State of Florida.

MR. TAYLOR:

About like most everybody else who has gotten up so far, I haven't much to say. Mr. Boyd seems to be about the only man who came here well fortified.

I am very much interested in this discussion since the matter of fertilizer grades is one that is very close to us. We have had a lot to do with it in the past and probably will have in the future. We, like the VC Company, are very much pleased that there has been a reduction in the number of grades. I believe Mr. Boyd brought out that Florida, in the pre-war period, had some 900 grades or brands, and of course that means a lot of clerical work to our department—a lot of trouble—registering, etc., and they now are down to about 32. That is fine. Of course, we are all concerned, I expect, with what is going to happen in the post-war period, and I think perhaps that is in the back of the minds of most of us wherever such conferences as this are held. I think it is a very important thing and I am tremendously gratified to hear Mr. Boyd say that his company, at least, is pleased with this reduction in the number of grades and brands. I don't know how many of you in the past years have discussed this question of reduction of grades with fertilizer companies doing business in this state, but I have on a good many previous occasions. However, up until the Government took the situation in hand, I was never able to

get a very hearty response from the fertilizer industry on the question of reduction of grades. Apparently when they were told that they had to do it they went ahead and did it, and now they seem to like it. I think that is typical of what frequently happens, particularly in regulatory work of any kind. People don't change until they are made to change and then they find they are glad it happened. But it never would have happened in this case unless somebody had made them do it. Now we have succeeded in getting this reduction in grades I think our problem is to capitalize on it and keep it; and perhaps even go a little further.

As I say, I had no intention of trying to discuss this question, and made no preparation for it. Nevertheless I want to assure you gentlemen, all of you, that so far as the Florida Department of Agriculture is concerned, and certainly so far as its Chemistry Department is concerned, we will be glad to cooperate in any way we can in this program for the post-war period; and I think it is important that we do make some plans for it. Otherwise when the control is taken off again pretty soon we will drift right back to the old status and we will again have this multiplicity of fertilizer grades; and it will be much harder to get back where we are now. So I think the time to consolidate your gains is now, while you have them.

I would like to make this point while I am discussing the matter and that is that the recommendations for any further changes in these grades are going to have to come primarily from you gentlemen here. I think that is as it should be. We will be only too happy to assist or cooperate in any way, whatsoever, even to the point of assisting in any legislative changes that might be necessary; and I think perhaps some changes in the fertilizer laws might become necessary. I don't think it would be difficult to get those changes made, provided you go about it in the right way. To my mind the right way is for the Experiment Stations, the Fertilizer Industry and the Department of Agriculture to get together and decide on the program you want and agree on it, and then put it over. Otherwise, if the industry isn't informed of what is wanted and what is proposed, some sharpster who has a friend in the Legislature, when he hears of a bill that may affect his business, is going to wire that friend to hole up the bill until he finds out what it is all about; and the first thing you know it is in trouble. If you meet a lot of opposition and you don't know where it is coming from or how it got there you will find nevertheless that it may be pretty effective. But if the industry is satisfied, if the Experiment Stations and the Department of Agriculture can agree on what they think is right and what they want, I think it will be a very easy matter to put the program over and hold what we have—in other words, consolidate the gains we have made.

CHAIRMAN VOLK:

Thank you, Dr. Taylor. We greatly appreciate this very solid advice. It seems, then, that the first thing we should do is for the men concerned with the establishment of the grades within the various states to get together. This is as good a time as any to express opinions on that point. Mr. Stokes, have you anything to say on this subject?

MR. STOKES:

I am very much interested in Mr. Boyd's discussion. We have had a good deal of correspondence. I think he has a good point. It just goes to show, however, that when you put one color over a whole territory it doesn't necessarily mean that it is going to be the same. While we are actually growing the same crops in many instances, the farm practice of growing those crops varies somewhat in those three areas. That, of course, is probably the reason for some of those differences in fertilizer grade recommendations.

In the past we have had good cooperation between and among the folks in the three states under consideration, together with the whole southeastern group These things have been discussed many time in an effort to find out some of these difficulties that Mr. Boyd has mentioned and there has been a good deal of ironing out thru the years. I think perhaps there can be further ironing out. We made those suggestions as to grades based, of course, on a number of things in discussion with the fertilizer people themselves as to what they were selling, and with reference to the State Department of Agriculture as to what their registrations would show, what growers were saying, and with respect to what our limited fertilizer experiments show. All those things were considered in the general planning and I feel we are now pretty close together.

Of course, at times, there actually does occur situations like this: A 0-14-5, for instance, is a popular fertilizer and rightly so in some sections of Florida. In fact our limited experiments in west Florida on peanuts indicate that we probably would be suggesting a saving so far as money is concerned, if they used a 0-14-10. They may be used to a little different practice in Alabama in comparison to Florida. We haven't been able to show any great need for too much potash applications to peanuts. Some is needed, but not a great amount.

We have less acreage in cotton, perhaps, in the territory concerned, in proportion to peanuts, than you do in the Georgia-Alabama section. The practice over there with reference to the fertilizer used for cotton has an influence on the feed crops, and that could account for some of the differences in grades recommended. All of those things are in the picture. We would be glad, of course, to meet with Georgia-Alabama people for further discussion of the matter at any time. I believe that eventually the situation can be simplified, permanently.

MR. BOYD:

I don't want to leave the impression—of course Mr. Stokes and I are in agreement on this -that there are not still further refinements that we think could be made, small ones though they may be. Let me illustrate one more point while I am up again. Reference is to this 4-12-4 fertilizer which we have had in all three states. Alabama has finally cut it off their list. At the last meeting we had Georgia insisted on keeping it on their list. I judge that it is used largely in north Georgia on heavy lands as a high phosphate fertilizer. However, if you look up the statis ics on sales, Georgia doesn't use much 4-12-4 fertilizer. It is one of the low-tonnage fertilizers in the state. Florida still has it on her list and if you look up the sales on it you will find them almost nil. In other words, if Florida is not going to use any 4-12-4 it would be just as well that we didn't have it on the list. As it is now, we have to make a little pile, but I can just about carry off on my back the little that we sell. If you don't need any more than that I am sure there is some other grade that would do just as well. It is these little refinements that seem to be the next task.

DR. JAMISON:

The thing that worries me most in all these discussions is the references that are being made to "peanut fertilizers", "cotton fertilizers", etc. We have attempted in setting up a list of grades in Florida to avoid designating any particular grade for any particular crop. That is why growers have a right to use any of our grades on any crop; and I would dislike very much to see any situation or control arise whereby the grower would be denied this privilege. In other words, I think just as Mr. Taylor has so very well put it, we should best try to hold down the production of grades. I believe our best assurance of being able to keep this list of grades down is satisfied growers. There is no question that we can get considerable opposition from growers when we develop grades which they can't get when they want to use them. I can see very clearly why this should be ironed out across state borders, but let us be sure that in this "ironing out" that we do not increase our list.

Mention has been made of 0-14-5; that is a very good case in point. If 0-14-10 is desired for west Florida we still increase our list of grades because we have to have 0-14-5 in south Florida. Thus in changing this list of grades so as to harmonize across state lines we may increase our grade list instead of decreasing it.

As far as different sections of the state are concerned I would very much regret any effort at putting restrictions on grades from section to section. That is almost what we would have to do if plans were made with the view of limiting those grades. Outside of the fertilizer that is used on shade tobacco in west Florida I don't believe there is a grade used out there which is not used in the rest of the State.

We should also remember that though we may have a fertilizer grade on that list that is not selling in considerable amounts, it is possible that it should sell in considerable tonnage. It is possible that a grade may not sell and yet be desirable for use. We do have some areas which demand a particular grade of fertilizer and it is just as necessary that we have that grade available as any of these other grades. As I recall we had 999 grades; one short of 1,000. We have reduced that by over 900 grades; and I think that is a good beginning. Furthermore, from the growers' standpoint, we have had a minimum of complaint that they haven't been able to get the other grades that they might feel they desired.

I would therefore suggest that in order to secure the gains which have been made, and make them permanent, we moderate our recommendations just as far as possible.

Dr. Collins:

We have two states near us with reference to the 4-12-4 fertilizer. This little belt of Georgia soil goes into Florida. They have a high phosphate fixation. I think you will find 4-12-4 is used in that particular section. In reference to your 3-9-9 for tobacco, we tried to get that available for cotton and there was considerable squabble about it. They finally threw it out for cotton. Then we tried to get it available for cotton for the southern part of the state and they said they would not split a state on a brand. In other words, if we could limit that formula to this area for cotton we would be much better pleased. However, War Food Production would not list it as splitting a state on the grade. They compromised to limiting the tobacco on it. I was not in the discussion on the shade tobacco fertilizer and I don't know anything about that. I would like to state that I would be delighted to meet with representatives of the three states in this discussion, at least six months before the next period of fixation for your grades for 1945. It is too late to do anything for 1944. We couldn't have done it the way this work has been conducted in the past where such meetings have been called about ten days before the deadline. It wouldn't have been possible to get all those concerned together, to say nothing of arriving at agreement on all points in a time so short.

Dr. Allison:

There are two or three questions I would like to raise with regard to Dr. Jamison's discussion. We all know that 3-8-5 is one of the most popular brands in the State; Dr. Taylor's records show that. I wonder, however, how many there are in the room who would use a 3-8-5 in Florida. It isn't a matter of changing grades; I am just wondering whether we could, within our own conference here, give a little thought to just what is a grade; whether 3-8-5 isn't a habit of use more than anything else. If the question is raised regarding a substitute for citrus I would suggest leaving citrus out of the picture for the moment. Let's just talk about the fertilizer. What are the arguments for using it? The question is raised largely as a matter of principle. In talking with Mr. Warner recently we agreed that 3-8-5 is sold largely on a cost basis and justification would be in general farming for west Florida. I think Mr. Warner feels that it is definitely a low grade fertilizer. You are giving them a carload of sand in every four or five carloads of fertilizer; and the trouble is it isn't even Florida sand! This points up the general proposition that we now have an opportunity in this field that we have never had before. Three years ago I thought I would never live to hear a fertilizer man say "we want less and less grades"; and Dr. Taylor will bear me out. I have tried for five years to think up some way in which we could get started on this reduction of grades; and here it has all but been dumped in our laps. We have an unparalleled opportuni y to make this change permanent if we will agree to do it—and get busy. It is probably more a matter of education than anything else.

Mr. Stokes:

Isn't reduction of grade intended to simplify the matter for the duration of the war only?

Dr. Allison:

We are hoping it isn't but that is the point. I think this is our big opportunity if we will only get busy.

Unknown:

Dr. Allison raised the point that in eliminating a popular grade like 3-8-5 it is largely a matter of education. However, if you eliminate before you educate, I am wondering if there isn't danger that you may lose all your grades—and gains.

Mr. Boyd:

I would like to add that 3-8-5 has been the leading grade in both Georgia and Alabama. Both those states have eliminated it because of its low plant food.

Dr. Jamison:

One reason why people go for 3-8-5 in this state is that it is a popular grade in the citrus industry and they can get their secondary elements in it. In other words, they need a low grade fertilizer in order to be able to get those other materials incorporated into it.

Dr. Allison:

It is sort of a *glorified* 3-8-5?

Dr. Jamison:

It is a high grade material if you get those other materials in it.

Mr. Boyd:

They have eliminated 4-8-4 in the other states. It was a leading grade in Georgia, but they cut it out because it didn't carry enough points of plant food. It may be all right agronomically, the ratio I mean; but economically it is bad.

Dr. Jamison:

I do feel we should consider our fertilizers on an optimum or even a maximum plant food basis and educate the grower on lower rates of application.

Dr. Allison:

The point that Dr. Jamison makes on education is a tremendously important one. Just as Dr. Taylor so well pointed out; if we want to make these changes we must also work with the fertilizer industry instead of just telling them about it. However, it is the national emergency condition which has made these big changes in the immediate past that we have been talking about and these changes are largely based on patriotism and necessity without very much reference to the benefit of such an educational program as we now refer to as a dire necessity to hold the benefits that have already come to us.

Dr. Jamison:

I agree with you and don't think all these changes have been slipped across. Many of the growers in the State are satisfied that they are not getting the proper grade of fertilizer for their crops; they are looking at it from an emergency standpoint.

Dr. Allison:

Do you think there are 960 cases of that?

Dr. Jamison:

No, but I think right now, at the present time, there should be a considerable amount of educational work under way.

Dr. Allison:

You feel they are just putting up with it?

Dr. Jamison:

Yes, as a war-time need.

Dr. Allison:

There are two more questions I would like to raise. The first one is in line with what was just said. What can we do, at least within reasonable limits, to make a lid for the situation, and when requests for new brands come in, really give them a test and see if it is an enthusiasm or a real need. We talked the other day about a pretty stiff registration fee. Has anything else occurred to any of you? I suggested $2.00 or $3.00 or even $5.00 and Dr. Taylor suggested $10.00 for certain new brands.

Mr. Taylor:

I might make a comment in that connection. I talked to an attorney of our Department and he said he didn't think such a charge could be made. He advised that the legislature was the only authority that could confer the right to collect fees and that while the Commissioner might make such a regulation, and it might be accepted, it certainly wouldn't be a legal procedure in case anybody did object to it or decided to give it a legal test. He was very positive in his opinion that it ought not to be done, that is unless the law is modified.

Dr. Allison:

The other question is to Mr. Boyd. We are now in search of educational material. By this I mean in particular arguments to the growers of advantages accruing from the reduction of the number of brands; definite economic reasons, if you please,

for continuing in the program and improving it. How much specific encouragement can your industry give us along that line? Could you make a definite showing that there is a saving in cost of manufacture of the reduced number of brands? Suppose the whole fertilizer business was handled on the basis of eighteen to twenty brands of fertilizer in contrast to say, six or eight hundred. Do you feel that there is a saving? Do you feel that there is a saving that not only can be shown to the grower but passed on to him of your fabricating a limited number of brands against making whatever anybody wants whenever they come in?

MR. BOYD:

I don't know how you are going to convert them. We can put it this way. The fewer grades we have to manufacture the better the service we can render him. We used to have three or four crews working in our factory; and now we have one. If we have all these grades strung around our warehouse it is just that much more trouble.

DR. ALLISON:

Suppose after the war you can get all the help you want for efficient handling of the work and you are making eighteen or twenty grades. How many more people in the office and how much more help in the factory and equipment and expense would it save in comparison to the 600 grades?

MR. BOYD:

It saves all around.

DR. ALLISON:

Is there a changeable argument there? Going back four or five years, in the pre-war days, some fertilizer manufacturers said that they could not see any appreciable saving. I can't help but believe that there must be some saving—a quite substantial one.

MR. BOYD:

I am sure there is a saving there.

DR. ALLISON:

We could at least make that Item 3 in an argument, but not, even though it may be difficult, before it could be made in dollars and cents to the grower.

DR. JAMISON:

There is one other thing about this grading which I think should be considered. We ran into a victory garden fertilizer program last year. These gardens made it necessary to attempt to correlate fertilizer practices against soil types; and more and more restricted grades of fertilizers are available for use. We run into the danger of restricting fertilizer grades too far. We have a grade that the Experiment Station believes is the best to grow celery in the Everglades. That is not on the list but it cannot be neglected in the future list of grades because it is the most efficient grade for that type of crop. By restricting your grade list are you going to give the grower a small cost advantage which he will accept.

MR. BOYD:

You can simplify the situation without seriously restricting grades. There is no use in having an 8 in Georgia and a 9 in Florida. That isn't an attempt to restrict growers. It is merely an effort at simplification.

CHAIRMAN VOLK:

Dr. Drosdoff, do you have anything you would like to say on tung, which has not been discussed so far?

DR. DROSDOFF:

Though it is getting rather late, there is one thing that I am particularly interested in, in connection with tung, in this tri-state area and that is the potash situation. We have found an acute potash deficiency in west Florida, south Georgia and the east Alabama section—perhaps not so much in Alabama. It seems that as you go further west in Florida, even on the same soil type, you run into less potash deficiency.

I noticed that in explaining this in relation to row crops Mr. Stokes put it on a basis of new lands, versus worn out lands. He was talking about the worn out land in the eastern part of western Florida and the newer lands in the western part which didn't seem to need as much potash with row crops. We find the same thing is true with tung. I am wondering, however, if it isn't due to a difference in the inherent composition of the soil. That brings up a question of classification of soils purely on the basis of general characteristics without some supplementary laboratory analysis. In any event, the limited data I have indicates that the eastern par. of western Florida and southern Georgia run much lower; for example, in exchangeable potassium than out in the western areas; and as you go still further west into Mississippi and Louisiana the Ruston fine sandy loam in that area has considerably more exchangeable potash than in eastern Florida. That, I think, is rather important from the standpoint of fertilizer recommendations and grades that could be used even on similar soil types. For example, we very often have found around the Tallahassee section that they have to go up to a rather high analysis of potassium fertilizer, 4-8-8 or something like a 4-8-10, in order to get enough potash. However, as you go further west that doesn't seem to be so necessary even on very similar soil types; and as you get into Alabama, at least insofar as tung is concerned, you don't encounter this potash deficiency problem except to a very limited extent. As you go farther west in Alabama you get out of this problem of potash deficiency almost entirely. I just thought I would bring in that question of soil type differences in relation to tung culture maybe not so much due to geological characteristics as to internal chemical characteristics.

Chairman Volk:

You have brought out a very important point—the proper evaluation of the primary and residual nutrients in the soils so that they can be economically assessed in determining the fertilizer program for tung or any other crop for that matter. I believe Mr. Simms' work is going to give us something of a state-wide picture along this line in a limited field. More of this type of work should be done. I think it should take precedence over some of the other work in which we have attempted soil analysis, but which can be better done by the plant. To me this is a very important field of study.

Dr. Drosdoff:

I think it is somewhat misleading to speak of a fertilizer for tung because you have to cultivate it according to sections. The fertilizer for tung in the Georgia area wouldn't be the same as in western Florida. It even depends on the location in west Florida, too. The requirements for the Milton area would be different from Tallahassee. I think Dr. Jamison is trying to get at that point too; that we don't want to go so far in reducing formulas as to restrict crops without seriously considering the soil and other environmental conditions under which these crops must be grown.

Chairman Volk:

To me it is inconsistent to emphasize methods of soil analysis to determine availability and the fertilizer formulas required for a particular situation. The value of the so-called availability test for fertilizer recommendations is not consistent at all. Any program of simplification in the listing of fertilizer formulas on this basis can quickly become one of over simplification. I am just pointing out the inconsistency of it and the fact that we should do something about it and try to come to some decision as soon as possible.

Inasmuch as closing time is approaching rather rapidly I should like to ask Dr. Allison if he may care to make something of a summarizing statement or proposal for any future action that should be taken.

Dr. Allison:

After listening to all this discussion it seems to me that the best thing we can do is to digest it for a time and then, in the course of two or three months, arrange a further meeting out in the field. We cannot hope to settle such a complex problem all at one time. If out of this discussion we can boil the suggestions that have been made down to an A, B, C situation that is reasonably consistent and satisfactory from the more important standpoints I am confident that we can then take up any further questions of change in a very satisfactory way by correspondence. In this way, by

the time of the next regional or national meeting on the question of fertilizer formulations, in five or six months, we should really be ready as Professor Collins has suggested. Certainly we here in Florida shall be glad to enter upon such an effort. I would be pleased to learn the opinion of others present.

DR. COLLINS:

We in Georgia would be very glad to cooperate in such an effort. I think it is fine.

MR. STOKES:

I see no other practical approach and feel we should get on with just as carefully developed schedule as possible.

CHAIRMAN VOLK:

I feel we have accomplished a great deal, especially in bringing many problems to the attention of those of us who are relatively uniformed who are not working closely with these problems, but are buried in the details of soil chemistry, itself. Certainly we want to thank those of you who have come from a distance to attend these meetings under existing conditions of travel, particularly Dr. Collins and Messrs. Brackeen and Boyd. If there is no further discussion I believe we can consider the meeting adjourned. Meeting adjourned at 12:30 P.M.

## BUSINESS MEETING

The annual business meeting of the Society was called by Vice President Volk immediately upon the close of the day-long discussion of soil survey problems on December 10. A nominating committee had been appointed by the Chairman before the recess of the morning meeting that was made up of Dr. Smith, Dr. Lott and Dr. Neller.

The chairman first asked for the report of the Treasurer. This was given as follows:

### REPORT OF TREASURER

(As of December 1, 1943)

| | | |
|---|---|---|
| Balance on hand January 1, 1943 | | $1,845.22 |
| Receipts (Jan. 1, 1943 thru Dec. 1, 1943) | | 1,544.35 |
| Total | | $3,389.57 |
| Expenditures (Jan. 1 - Dec. 1, 1943): | | |
| Printing | $1,050.96 | |
| Postage | 102.68 | |
| Telephone and Telegraph | 5.45 | |
| Stationery (incl. supply of envelopes for mailing Proceedings) | 41.77 | |
| Stenotypist (Belle Glade meeting, Proceedings Volume V-A) | 53.20 | |
| | $1,254.06 | 1,254.06 |
| Balance in Bank December 1, 1943 | | $2,135.51 |
| Approximate cost of three volumes of Proceedings to be printed | | 2,100.00 |
| Estimated Balance | | $ 35.51 |

The belated condition of the publishing of the Proceedings was commented on and the difficulties of the press acknowledged under present circumstances of work. A motion was made and carried that the report of the Treasurer be accepted.

The Chairman then asked for the report of the Resolutions Committee of which W. F. Therkildson is Chairman. In Mr. Therkildson's absence a Resolution of Sympathy was read for the death of one of the Charter Members of the Society, Mr. A. E. Kunze of Birmingham, Alabama, and of Dr. Wilmon Newell, Provost for Agriculture, College of Agriculture, Gainesville. Following a brief period of respectful silence the Chairman ordered the resolution spread on the minutes of the meeting and copies of it distributed as provided on the face thereof. It will be found published in full on page 69 of this volume of the Proceedings.

The Secretary then read what was accepted as a tentative draft of a "Resolution Pertaining to the Present Status of the Soil Survey and the Need for Improving and Extending it as Rapidly as Possible." The need for this resolution was repeatedly referred to during the day-long discussion of this general subject that immediately preceded the Business Meeting when a great many suggestions were made as to content and to whom it should be addressed and to whom copies of it should be sent. The resolution was accepted by motion and second and carried with voice vote in the general form in which it was presented and the Chairman ordered that it be spread on the minutes of the Society as a permanent record of the thinking of this group on the subject and copies of same quite widely distributed as provided on the face of the resolution. This will be found in printed form on page 70 of this volume of the Proceedings along with Secretary Wickard's letter dated April 10 acknowledging receipt of a copy of the resolution from the Secretary of the Society as transmitted by a letter dated February 19.

The Secretary then read a resolution in very preliminary form pertaining to the resumption of the topographic survey in the State which also had been referred to as a prime need from several standpoints of use during the morning and afternoon meeting on the Soil Survey discussion. After a limited amount of discussion the resolution was provisionally adopted with the understanding that Dr. Herman Gunter, State Geologist in Tallahassee would be asked to serve as ex-officio on the Resolution Committee for the completion of the draft. This resolution is to be found published in its final form on page 73 of this volume of the Proceedings.

The Chairman called for the report of the Nominating Committee in whose behalf Dr. Lott reported their completely favorable consideration of Prof. W. E. Stokes, Head, Agronomy Department, Agricultural Experiment Station, Gainesville, as Vice President for the coming year. Dr. Lott then moved that the nominations be closed and the Secretary be instructed to cast a unanimous ballot for Prof. Stokes. Dr. J. R. Neller seconded the motion and there being no further nominations or discussion Prof. Stokes became Vice President of the Society. Mr. Volk, Vice President during the past year, automatically became President.

There being no other business to come before the meeting it was declared adjourned at 5:30 P.M. after the incoming President asked for a brief meeting of the Executive Committee to follow immediately.

## MEETING OF EXECUTIVE COMMITTEE

President Volk called the meeting of the Executive Committee at 5:30 P. M. In the absence of Mr. H. I. Mossbarger, retiring president and now a member of the Executive Committee in the place of Dr. J. R. Neller, only limited discussion was had.

The first action of the committee was to reappoint R. V. Allison as Secretary-Treasurer of the Society and he then automatically became a member of the committee.

Orlando was discussed tentatively as the next meeting place particularly with the view of giving especial emphasis to Soil and Water Conservation in the Kissimmee and St. Johns River Valleys as companion to the Interim discussions that have been had during the past two years of the physical and economic problems of the Everglades area and published as Volumes IV-A (1943) and V-A (1944), of the Proceedings of the Society. Tentatively the idea was favorably received and the decision taken to develop a program into tentative draft as soon as possible so that a definite decision could be made and preliminary arrangements initiated.

Alternate plans were made for a further meeting of the Executive Committee in the course of the next few weeks or for discussing the details of the above by correspondence.

There being no other matters to come before the committee it was declared adjourned by President Volk at 5:45 P.M.

## RESOLUTION OF SYMPATHY

WHEREAS, death has taken from our rolls during the year the following esteemed members of the Society whose sincere and constructive interest in all aspects of the work will make their absence felt for a long time to come,

NOW, THEREFORE, BE IT RESOLVED, that this expression of sorrow over this great loss to the Society and of sympathy to the immediate families of the deceased be spread upon the records of this Society and a copy of same be sent to the closest member of the family of each:

A. E. KUNZE, Birmingham, Ala.

WILMON NEWELL, Gainesville

A RESOLUTION PERTAINING TO THE PRESENT STATUS OF THE SOIL SURVEY AND THE NEED FOR IMPROVING AND EXTENDING IT AS RAPIDLY AS POSSIBLE.

WHEREAS, the development and conservation of our soil resources are vital to the public welfare and basic to the physical permanence of the State and of the Nation; and

WHEREAS, effective programs of agricultural research, and of soil conservation and land development based on research, must have as their foundation carefully prepared soil maps and reports; and

WHEREAS, soil survey reports, for greatest use in local, state and national planning, should be generally uniform and largely based upon a simplified interpretation of the soil map; and

WHEREAS, State workers should, and in fact must, look to Federal leadership in investigational work of this nature if the overall survey is to have a satisfactory national pattern; and

WHEREAS, the division of responsibility for soil mapping between two agencies of the Federal Government has resulted in considerable confusion and does not encourage the development of a uniform approach to the problems of soil classification and the preparation of soil survey reports.

NOW, THEREFORE, BE IT RESOLVED that these basic weaknesses in the execution of the soil survey and preparation of soil survey reports be urgently brought to the attention of proper officials in the Department of Agriculture and in the War Food Administration who are in a position to act upon qualified recommendations.

BE IT FURTHER RESOLVED that the Soil Science Society of Florida go on record as unconditionally recommending the delegation of authority for the soil survey work of the Federal Government to a single agency as a first step in the development of a uniform method of obtaining and interpreting soil survey data.

BE IT FURTHER RESOLVED that such a reorientation and reorganization of soil survey work and rededication of its purpose be regarded a logical first step in the reorganization of our research and extension programs in soils in order that they may afford much needed support for land use and other agricultural planning that in any way involves soils in the future.

BE IT FURTHER RESOLVED that, IN VIEW OF THE IMPORTANCE OF THE SOIL SURVEY TO POST-WAR AND ALL OTHER FUTURE AGRICULTURAL PLANNING, a copy of this resolution be sent to the Florida State Planning Board; to the President of the Association of Land Grant Colleges and Universities and to each of the six members of the Joint Committee on Soil Survey of that organization and certain agencies of the Federal Government; to the Director of each

Agricultural Experiment Station in the Southeast through the Chairman of the Soil Survey Sub-Committee of the Southeastern Agronomy Research Committee; to the Office of Experiment Stations of the United States Department of Agriculture; to the Office of War Food Administration; and to the Secretary of Agriculture.

W. F. THERKILDSON, Chairman
Resolutions Committee

Soil Science Society of Florida

Gainesville—December 10, 1943

U. S. DEPARTMENT OF AGRICULTURE

Washington, D. C.
April 10, 1944

Dr. R. V. Allison
Secretary-Treasurer
The Soil Science Society of Florida
College of Agriculture
Gainesville, Florida

Dear Dr. Allison:

This is in reply to your letter of February 19 addressed to the War Food Administrator and your letter to me of February 18, transmitting copies of the resolution of the Soil Science Society of Florida, dated December 10, 1943, regarding the need for a strong coordinated program of soil survey and other soil research as a basis for planning agricultural research and extension programs. It is regretted that reply has not been made to your letters prior to this time.

First of all, we wish to assure you of our continuing concern regarding this need, basic alike to agricultural programs of the Department and of the State Land-Grant Colleges. Further, we are glad to know of the deep interest in and thoughtful consideration of the basic research needs in soils by you and your associates.

As a step in the direction that you indicate, responsibility for the technical and scientific aspects of soil classification, nomenclature, and mapping was consolidated in one Bureau—the Bureau of Plant Industry, Soils, and Agricultural Engineering—in the summer of 1942. At the same time, acting in part upon the suggestion of the Association of Land Grant Colleges and Universities, a Joint National Soil Survey Committee, made up of three representatives each of the Department and of the Land Grant Colleges, was established. It is the function of this committee, of which Dr. Richard Bradfield of Cornell University is chairman, to advise both the Department and the Colleges on questions of policy regarding the soil surveys and related soil research.

This committee has been giving and is now giving study to the kind of problems that you raise. As their work proceeds the suggestions they develop should be of special interest to all concerned with the work because of the broad and manifold consideration of both State and Federal problems that will necessarily engage their attention.

Again we wish to thank you for this evidence of interest and concern over one of our vital programs, especially significant to the post-war adjustments in agriculture.

Sincerely,

CLAUDE R. WICKARD
Secretary

A RESOLUTION CALLING ATTENTION TO THE NEED FOR AN ENERGETIC EXPANSION OF THE TOPOGRAPHIC SURVEY IN FLORIDA AND RECOMMENDING A PROJECT IN THIS FIELD AS A PART OF THE POST-WAR PLANNING EFFORT UNDER THE DIRECTION OF THE STATE GEOLOGICAL SURVEY.

WHEREAS, elevations and contours of the land have a definite and important influence on land use; and

WHEREAS, a knowledge of land elevations and contours is necessary for a proper interpretation of soil survey data; and

WHEREAS, a great part of the State of Florida has not been covered by topographic surveys, and many of the quadrangles surveyed are in non-agricultural areas.

NOW, THEREFORE, BE IT RESOLVED that the Soil Science Society of Florida go on record as urging the completion of the topographic survey of Florida as rapidly as possible, and that, as far as it is convenient to do so, the better agricultural areas be covered first.

BE IT FURTHER RESOLVED that this resolution be spread upon the minutes of the meeting and a copy thereof be sent to the Florida State Planning Board; to the Chief of the United States Geological Survey; and to the Head of the Florida Geological Survey.

RESOLUTIONS COMMITTEE:

W. F. THERKILDSON, Chairman

Soil Science Society of Florida

Gainesville—December 10, 1943

HENRY I. MOSSBARGER

## OFFICERS OF THE SOCIETY

1943 Retired

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|---|---|
| Henry I. Mossbarger | President |
| Gaylord M. Volk | Vice President |
| J. R. Neller | Member Exec. Committee |
| R. V. Allison | Secretary-Treasurer |